

P E R S O N A L

weekly

COMPUTER

50p March 31, 1984 No55

NEWS

BRITAIN'S BIGGEST WEEKLY

TALKING TO THE WORLD: *Micros, modems and communications*

SPECTRUM CALLING
Routines for roaming
round the ROM

DRAW THE DRAGON
A hi-res graphics
program to key in

MICRO LIGHT
New lightpens for the
64 and BBC

CONSUMER ADVICE
Protect yourself against
mail-order perils



PCN TOUCH-TEST
Will Hewlett Packard's
new touch-screen HP-150
make the grade?

TELEVIDEO TS 804

THE MASTERPIECE FOR UP TO FOUR KEYBOARDS

ITS PERFORMANCE WILL BE MUSIC TO YOUR EARS



POWER TO HAND – FOR UP TO EIGHT HANDS

Initially, you may only need your system to be run by a single operator – expanding it later as the need arises. This is where the TS 804 really comes into its own. As a single-user system it is extremely efficient and powerful. As your business grows, and your requirements change, it will support up to four users – working independently – via any ASCII terminal.

With its high-performance architecture and unrivalled array of peripherals, the TS 804 is a versatile and significant addition to the extensive TeleVideo microcomputer range. It is the perfect answer for professional business users who do not need the even more elaborate facilities and greater capacity of the TS 806 or TS 816.

SO MUCH, FOR SO LITTLE

There's never been anything quite like the new TeleVideo TS 804.

For a start, it's the only multi-user micro in one single desktop unit and given its outstanding specification and performance, its economy is little short of astounding. Whatever the claims made for other systems, we challenge you to find a comparable system at the same cost.

IT'S HARD TO BEAT FOR SOFTWARE

The TS 804 has available to it one of the largest libraries for any micro, its standard MP/M^{II} operating system being fully compatible with CP/M. The OASIS system is offered as an alternative. In all, you can call on some 2,000 high-quality software packages.

WHICH WAY DO YOU WANT TO GROW?

With the TS 804, you can choose not only how big you want to grow, but also in which direction. You have several choices.

Any ASCII terminal, serial printer or modem can be supported by each of the user ports, and a parallel printer can also be added. An expansion disk provides 15 Mbytes of formatted hard disk storage and a 14 Mbyte cartridge tape unit allows for easy system back-up.

TS 804 provides a high degree of compatibility with software written for the ALTO5 580 product line.

AND THERE'S A LOT MORE . . .

We simply cannot do justice here to the impressive advantages of the TS 804. For the full, fascinating details, and for more information on the TeleVideo Business Computer range, contact **THORN EMI TeleVideo Marketing**,



Silbury Court,
372 Silbury Boulevard,
Witan Gate East,
Central Milton
Keynes, MK9 2AF,
or telephone
(0908) 668778.

TELEVIDEO. THE COMPUTER THAT MOVES WITH THE TIMES.



TeleVideo
Business Computers

REGULARS**Monitor 2**

West Coast Faire report page 2; The law gets tough on piracy, page 3; Oric reveals upgrade terms, page 3; Local network links various systems, page 4; Thought control brings 1984 to Apples, page 5; and PCN reports from Softcon, page 7.

PCN Charts 9

Who's up Who's down and who's who in games and micros.

Random Access 10

Your letters printed here and £10 for the star letter of the week.

Routine Inquiries 12

Our panel of experts quashes queries and solves your problems. Let PCN put you right.

Microwaves 14

Tips and hints for BBC, Memotech, Newbrain, Commodore 64 and Dragon.

Clubnet 16

PCN's special report this week comes from Grimsby.

Databasics 66

The best microcomputer buys.

Readout 72

New books about Acorn's Electron, the Vic 20, and Machine Code are reviewed.

Billboard 73

Second hand sales of your hardware and software.

Quit 80

Time for a laugh and a look at the upcoming events.

SPECIALS**Spectrum sights 25**

Steve Kramer leads you on a roam round the Spectrum's ROM and reveals several very useful routines.

Mail order 28

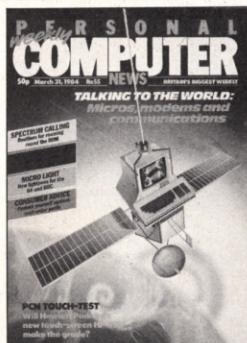
PCN gives you the word on how to make sure that mail order purchases don't turn into mail order nightmares.



MENU

March 31, 1984

No 54

**MICROPAEDIA****Cover story Communications**

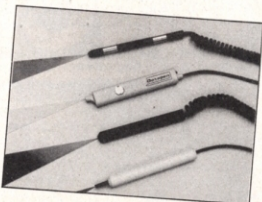
Talking to the world with your micro is the featured topic in Micropaedia for the next three weeks. PCN kicks off the series with a look at what you can DO with communications devices. Included this week are hints on using bulletin boards, accessing Prestel and Micronet and what you can do with a Teletext receiver.

PRO-TEST HARDWARE**The HP Touch 20**

Geoff Wheelwright puts Hewlett Packard's revolutionary touch screen micro through its paces and finds a highly professional micro lurking beneath the gimmicks.

**PRO-TEST PERIPHERALS****The light side 34**

Light pens for the BBC and Commodore 64 point the way to easy graphics. Piers Letcher investigates.

**PRO-TEST SOFTWARE****Spectrum prolog 50**

David Janda tests yet another language for the all-singing multi-lingual Sinclair.

**Electron Graphics 51**

Acorn's mini-Beeb draws the line and reviewer Kevin Bergin is impressed.

GAMEPLAY**Vic 20 46**

Patience played on screen and Metagalactic Llamas Battle at the Edge of Time.

Oric 1 48

Battle with Norse Gods in Loki or play the Pied Piper in Rat Splat.

Atari 49

Atari's tennis game wins set and match.

PROGRAMS**Dragon 54**

A powerful drawing program for the Welsh micro.

Atari 61

A hardware flash simulator to put pazzaz in your programs.

Faire wears its Mac

From Ian Scales in San Francisco

The West Coast Faire is probably the closest the US gets to a ZX Microfair.

It's an annual affair and this, the 9th, is being held as always in sunny San Francisco. It's just a stone's throw from Silicon Valley — an area of concentrated high-tech commercial activity. The Valley hosts such notables as Apple Computer Corp and it's Apple's Macintosh which is stealing the show. But people attending the show won't have to steal a Mac — Apple is giving away one a day through a draw of registration cards.

Unlike the recent PCN Mac prize, entrance in this Mac draw doesn't come cheap. It costs enthu-

sias \$12 each to be admitted to the Faire (\$20 if they want to come back over two or more days). This comes out to around £9.

The atmosphere is halfway between a business exhibition and an enthusiast's fun-show. But while there are a lot of open neck shirts and jeans, it seems dominated by the over-18s — nothing ZX about this.

Among the notable exhibitors was Memotech Corporation and its MTX micro, attracting a lot of attention. But the attraction of this machine probably has as much to do with its capabilities as with the lack of other notable new machinery.

Apart from the concentration on Macintosh (which is, after all, a

54) but it may also help to salvage part of the company's reputation, in tatters at the moment over the QL debacle.

Sinclair expects to get 20,000 Microdrives and Interface 1 a month into the shops in the first months of what promises to be a substantial campaign. The units individually cost £49.95 each, but if you buy an Interface 1 and a Microdrive together the price is £79.95. Cartridges cost £4.95 each.

Although first deliveries of the QL are scheduled for the end of March, Sinclair has said that building up production of the machines to full capacity will take some time. The major slowing factor in this is likely to be quality control — nothing could kill the QL market faster than massive problems with the first few thousand machines delivered.

'local' machine to San Franciscans), the emphasis of the show seemed to be on software and 'wordware' (books and software bundled together) rather than hardware. On the software side it was, of course, the IBM PC which seemed to be running everything in sight — no surprises there.

There was, however, a slight surprise on the storage front — Winchester drives seem to be getting significantly cheaper. A company calling itself Electro Mavin was advertising a 20 Mb 8in floppy at the equivalent of about £1,100.

The Faire was also big on seminars — one of the more interesting was entitled 'The Personal Com-

puting Backlash' which appropriately rounded the series off on Sunday. This seminar was divided into two parts, took a whole afternoon and covered such discussion topics as 'The Emperor's New Computer, or What if We're not Having a Computer Revolution' which speaks for itself, and 'The Morning After: Anti-Computer Backlash and the Arrival of the Mass Market Home Computer.'

The computer industry itself also seemed to be having second thoughts. The overall impression of the show was that this is a time of consolidation for the industry, especially for those who survived last year's crippling price war on the home micro front.

Microdrives in the shops

The first Microdrives are starting to appear in the shops, ahead of the schedule laid down by Sinclair last week.

The company announced that the peripherals would be in high street shops from April, but with more than a week left in March they were available in the West End of London. The exuberant proprietor of Computers of Wigmore St reported that he'd sold six of a batch of 40 within half an hour of them being delivered on March 22.

This is a timely development as far as Sinclair is concerned. Not only should it nip in the bud any further trade in order forms (Issue

Fuller figure, slim pickings

The good intentions of Spirit Software and Fuller aren't cutting much ice with some of their customers.

Spirit has told PCN that customers who'd sent money for its Formula One Racing game will be offered a refund or would receive the goods in two weeks.

A letter was sent out to customers saying that the games would be ready for despatch on March 12, but PCN doesn't know of anyone who's actually received a copy of the game. The letter itself made no mention of a refund.

Some weeks prior to this Fuller's Roy Backhouse promised to

attend to the queries of a number of customers who had written to PCN. Although some of these customers have been refunded, or have received goods, others have not. The Fuller hotline itself, although designed to handle complaints, is now so over-loaded as to be well-nigh useless.

These two are by no means the only companies exhibiting a near miraculous capacity for messing up their mailing lists. The message to potential customers would seem to be that you should be very careful when you're sending money through the post.

ASA slams Commodore

No fewer than ten micro companies have been hauled in front of the Advertising Standards Authority

Cyborg disk drives

Readers with complaints about the non-appearance of the Cyborg disk drive (Issue 42) are invited to contact the French equivalent of the Advertising Standards Authority, the BVP. Mme Lenglet of the BVP has asked for complaints about Haytech, maker of the Cyborg unit, to be sent to her at BVP, 5 Rue Mermoz, Paris 75008, France. Letters (in English or French) should include the date on which Haytech was contacted and the place in which you first heard about Cyborg.

The BVP has the authority to take action against companies that breach France's trading and advertising laws.

(ASA) for using misleading advertising.

Commodore, with two previous complaints upheld against it in the last 12 months, led the latest list of offenders with its 'What do you want, promises or peripherals?' advert.

The advert from the holder of the Royal Warrant claimed that 'Commodore dealers have a complete range of peripherals available now'. Seventeen members of the public from various parts of the country complained that Commodore's dedicated cassette recorder was not available in local shops.

'I have to admit it's embarrassing,' said Howard Stanworth, Commodore UK's general manager, 'We ran out of recorders after the advertising was placed.' The ASA upheld the complaint saying that it con-

<p>"WE HAVEN'T A COMPLETE RANGE OF PERIPHERALS FOR ANY OF OUR COMPUTERS, SIR. POSSIBLY NEXT MONTH."</p>	<p>"PERIPHERALS? YES, COMMODORE HAVE EVERYTHING YOU'RE LIKELY TO NEED, SIR, RIGHT NOW."</p>

sidered that Commodore was 'at fault in running a campaign, the major platform of which was that the featured items were in stock.'

Acorn, with three previous complaints upheld in the last year, was also in the firing line for promising the availability of Electrons from WH Smith, Acorn dealers and by phone for credit card holders.

Acorn was let off with just a warning by the ASA. It accepted Acorn's rebuttal that it had anticipated that Electrons would be available by the time that the adverts appeared. It then sought to withdraw the advertising when it ran into the product shortage.

Other micro companies who had complaints upheld by the ASA were Atari, CK Supplies (for Spectravideo adverts), East London Robotics, Lasky's, Powertrain and Silica Shop.

Sinclair (three complaints upheld in the last 12 months) had a close shave with an advert that claimed that the Spectrum had a screen resolution of 256 by 192 pixels. A Spectrum user complained that a resolution of only 256 by 176 pixels could be obtained from Basic. Sinclair's explanation, that the full resolution could be obtained using machine code programs, was accepted by the ASA.

Police swoop nets tape haul

By John Lamb

Police and Trading Standards Officers in the North of England have uncovered two alleged cases of computer games counterfeiting in Salford and Hull. The Salford case involves cassettes said to have a retail value of £100,000.

Police in Salford have arrested and charged Donald Freeman with criminal deception following a raid on a warehouse in the city during which cassettes containing different games were seized.

The games are Schizoids, Bugaboo, Lunar, Zoom, Atic-Atac, Alchemist, Harrier Attack, Flight Simulation, Kong, Jet Set Willy and others.

The exact number of games the police have in their possession is not clear. David Ward, director of Ocean Software, who went to Salford to identify his firm's products, claims the police have some 20,000 cassettes with a retail value

of around £100,000 in a cell. Police valued the cassettes at £9,500 without taking into account the games recorded on them.

Mr Freeman has already appeared at Salford City Magistrates Court, but a date for a Crown Court trial has yet to be set. Meanwhile, Salford police are continuing enquiries in the North West.

Trading Standards Officers in Hull have seized a smaller haul of 150 cassettes after obtaining a search warrant against a trader in the city. The raid, which was made under the Trade Descriptions Act, followed a tip-off from Software Projects. At press time, charges had yet to be brought.

Local Government Trading Standards Officers are empowered to prosecute under either the Trade Descriptions Act or the False Description Act. Fines of up to £1,000 per charge can be levied.

Bamboo Oric...

The humble Oric-1, out of production but still France's favourite micro, has been exposed as an agent of Japanese imperialism.

PCN can exclusively reveal that the system with the world's most famous ROM was ready to take its place in the vanguard when the Japanese made their long-awaited move to take over the UK home computer business. Some of you might quite innocently have bought the Oric-1 Ghia model without realising that alongside the quirky Basic it harbours no less a feature than a Japanese character set.

Hidden deep in the ROM of some machines this surprising addition to the Oric's features has been known to spring out and take over the entire system. A reader told us: 'I was playing around with an Oric compiler from Bambi Software. I

ran the compiler and then went back to try to run the lot on an Oric Basic; I tried a sequence with an Escape or a Control character and the ROM printed up Japanese characters. I couldn't get out of it without switching off.'

Oric, slightly puzzled, offered two possible explanations. It has a licensing deal with the little-known outpost Oric Japan, and some systems made for the Far East may have wandered in the opposite direction. Or a development system of a Kanji character set, dating from March 1893, led to some EPROMs which may have found their way into production models.

Without a reliable means of controlling the character set it is, of course, completely useless. But then, unless you read Japanese, it's more or less irrelevant.



Oric-1: a sting in the tail.

IBM limits supply of PC and XT micros

Just two weeks after announcing 20 per cent price cuts, IBM has been forced to admit that the PC and XT micros are in short supply because of lack of components.

All IBM dealers have been told they can order a maximum of only 25 machines a month and deliveries will be made four weeks after the orders are placed.

'In common with other high technology companies we have been hit by the world-wide shortage

of components,' a company spokeswoman said. The shortages are not only in the Intel 8088 processor but also 64K RAM chips and TTL components.

To get round the problems the company has signed a licensing deal with Intel and has already started pilot production of the 8088 in the United States.

'We have seen this shortage coming for a long time,' the spokeswoman said. 'That's why we negotiated the deal with Intel. We anticipate that component availability will improve in the next few months'.

The company admitted that the shortage of machines so soon after the price cuts announcement was embarrassing.

Late kick off

Commodore UK is asking International Soccer fans to be patient but the game is turning out to be a very late kick-off for many.

Commodore maintains that it is producing 2,000 copies into the country every fortnight, and that it has already sold 'a substantial quantity'.

But shopkeepers are telling a different story: 'We had one batch

of 72 that sold in about 3 days,' said one. 'I don't know when we'll have any more.' The story was the same in another shop—one batch, but no sign of any since.

The game, for the 64 only, has proved phenomenally popular and Commodore's Gail Wellington admits that the company underestimated its impact. 'We've made efforts to get more into production.'

Being cartridge-based the game is supplied from Hong Kong. When you can get it it costs £9.99.

... speaks out on user group policies ...

There is now no official Oric users' group. In a prepared statement Oric Products International says it will continue to support independent user groups, both national and regional, with information, but will in no way align itself with such groups.

The Oric statement comes amid

continuing controversy over the Tangerine Users Group (Issues 52 and 53). A split between Bob Green, the founder of the TUG and Oric Owners' Users Group, and Colin Nowell, a former director of the TUG, has left the group in limbo, and has led to Mr Nowell's launching rival groups for both the Oric and Tangerine.

Oric's policy now would seem to be that it neither approves nor disapproves of particular user groups. 'Oric has no ties with Bob Green, financial or any other,' a spokesman told PCN.

... and reveals upgrade shock

After months of speculation, Oric has decided how much it will charge 48K Oric-1 owners to upgrade their machines.

For the princely sum of £60, Oric will take your humble Oric-1, put a pretty black and red case with proper keyboard around it and exchange the old Oric ROM for a new Atmos one. The price includes VAT, post and packaging, the new Atmos manual and a new 12-month warranty.

The final price rests at the high end of Oric's original estimates for the upgrade. Only three weeks ago Oric was saying the cost of the upgrade would be 'between £10 and £70'—and that was two weeks after denying original reports of a £50 price on the upgrade.

The company will also offer a similar upgrade for owners of 16K Oric-1 machines, although it isn't ready yet to give a final price on such an upgrade. It says the release of the 48K upgrade is ahead of the original schedule: an 'upgrade service for Oric-1 users — to convert their machines to full spec Atmos — will be available in April 1984, two months earlier than planned,' the official statement reads.

Dragon Data's trade-in terms haven't had Dragon 32 users flocking to the 64. According to a company spokesman only about 100 users have been attracted by the £140 deal (Issue 43), and the company isn't actively promoting the trade-in.

VIEW FROM AMERICA



Trail cools as FBI moves after hackers

By Chris Rowley

Certain types of right-wing American derive considerable satisfaction these days from the Soviet Union's total inability to join the micro revolution. October Revolutions are all very well but micro revolutions are beyond them.

The apocryphal story of the unfortunate Russian grocery clerk who got five years for possession of a mere mimeograph machine is currently popular here, along with guffaws at the Government licence required by prospective Soviet typewriter owners.

Ironically such an easy method of social control would probably find support today in the staunchly anti-Communist ranks of the FBI, where they are having to deal with the Hydra-headed monster called 'Computer Crime'.

Agents have studied white-collar computer crime for years at the FBI academy in Quantico, Virginia. However, the courses have concentrated on old-style embezzling-type crime on mainframe systems. The new reality of modem-welding micro users roaming Department of Defense data banks in search of adventure caught the Bureau flat-footed last year. But the FBI is making a strenuous effort to come to grips with this unexpected outbreak of anarchy.

To this end 6,000 new Burroughs micros have been purchased and there are refresher courses for the agents, dummy bulletin boards to trap the indiscriminate hackers, sting operations to hit software pirates, and widespread recruitment of informers in sensitive US computer centres.

But it's questionable whether the FBI can ever catch up. The determined hackers have gone underground and sophisticated criminals using top-of-the-line micros are proving very hard to trap. Someone in a motel room in Idaho can steal information from a bank in New York over a phreaked (illegally used) phone line and then sell it to someone in Los Angeles. Even locating such a criminal is next to impossible. In fact, even the most routine technological advances continue to embarrass the Bureau; for example, its radio scanner (titled KGB/770) was monitored by criminals with quality FM scanners — listen to the Feds all day and you're bound to hear something worth money to somebody. As a result agent's lives were threatened and major operations exposed. The FBI finally switched to coded transmissions, but of course where there is a code there is a determined hacker, so the codes will have to be changed constantly.

Small pay-off

Meanwhile there is still no Federal law against computer crime as such. Thus, in the case of the 414s who broke into mainframes all over North America last summer for kicks, laws directed at harassing or obscene phone calls were used to bring misdemeanour charges against two 21-year-olds. They pleaded guilty and are expected to receive small fines.

It isn't much of a pay-off for a case that had several agents working on it for weeks and which generated embarrassing media interest. Some critics of the agency's efforts say computer crime is basically a matter of lazy management and Crazy Kids should be treated as a minor problem. But the prospect of complete home phreaking hacker anarchy does have many authorities (especially AT&T) in something of a panic. There are kids with a Mount Everest complex out there who spend hours each day picking away at Defense Department computer defenses.

There are bulletin boards with Citibank account codes for sale. Non-prosecutable teens breaking into foreign computers, the theft of corporate information concerning stocks and shares, the possibilities for the future of this sort of thing seem limitless.

Already the use of blue boxes for long-distance phone phreaking is said to cost more than \$100 million and the market in pirated software downloaded over phreaked lines is put at \$200 million. Without the KGB's sort of power and influence how can the poor old FBI ever get this particular genie back in its bottle?

Net catches more micros

Micomite's Fileserver local area network is barely a month away from linking CPM, CPM-86, MSDOS, and PCDOS systems in one system.

The Fileserver network was well-established in the area of Z80-based CPM systems — the Toshiba T100 is the latest system to be supported — but its move into more diverse configurations is now due in May. Besides an interface to the IBM PC, Micromite is also working on links from the network to the DEC Rainbow and the Sirius.

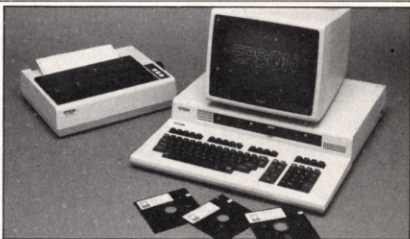
Prices start at £6,872 for the basic system, with the interface card costing £253 for each station.

Fileserver lets you network a maximum of 254 different microes over a maximum distance of one

mile. It consists of a 44lb desktop unit in three parts.

The first is the disk storage area which will take 8in Winchester disks of 10, 20 or 40Mb capacity, while the second is an inbuilt 20Mb tape streamer. 'We can dump 20Mb of data from the Winchester to the cartridge in under five minutes — floppy disks are no good as backup,' said sales director Mike Webb.

Lastly, there is the controlling hardware and software that communicates with the different micros. The system already works with such Z80-based micros as the Altos, Sanyo 1150, Epson QX-10, Pied Piper, Phillips 2000C and 2500 and Decision Mate V. Micromite will supply networking interfaces for other Z80 micros on request.



Epson QX-10 starter pack — one-stop shopping from STC.

Japan fans pack them in

Your starter for a Japanese micro could be a lot less expensive as more distributors catch onto the starter pack.

Commodore's Vic-20 has risen to number two in PCN's charts on the back of the starter pack scheme, and the lesson hasn't been lost on CGL and STC Electronic Services.

CGL, distributor for the Sord M5, has put together a package that includes system data recorder,

Basic ROM cartridge, Introduction to Programming, manual, and user's guide, plus two games and all the necessary cabling. The price of all this is £149.95 — the system alone normally costs this.

STC Electronic Services (0279 26777) is offering the Epson QX-10 at the centre of a package that also includes an RX80 dot matrix printer and the Peachtree software range.

The cost is £2,299, a saving that STC puts at £500 although the practice of bundling software with hardware may be common enough to make this an over-estimate in many users' eyes.

Acorn aviator hits runway

Acornsoft has rolled Aviator, a new flight simulator for the BBC micro, out of the hangar.

The simulator puts you into the hot seat of a World War II Supermarine Spitfire MkII and theoretically behaves like the real thing.

Helping out with the launch was Air Vice-Marshal Sandy Johnstone, one of the original Spitfire pilots, who demonstrated the program at the RAF Museum, Hendon,

before a genuine Spitfire.

The package comes on disk for £17.65 or cassette for £14.95 and includes a comprehensive flying manual and a map of the 'World'. In the program's world is a bridge for flying under, and 'Acornville', a town (immediately dubbed 'Cornsville') to fly through.

The simulator also includes a theme section in which aliens begin to grow in the fields surrounding Acornville. Your aim is to zap them before they grow on to the town. Odd about alien zapping in a Spitfire but who worries about what happens in computer games these days?

All in the mind

A Californian has come up with what could be the last word in how to sidestep computer keyboards — his Apple works by thought transference.

Robert Dilts' system makes mice look pedestrian and even leaves touch-screens in the shade. Thought takes practice but after a while you can achieve what amounts to close cursor control just by thinking about it.

He demonstrated it on an Apple IIe last week, but versions for Commodore and Atari systems are also being developed. It has serious applications: the potential for the disabled is clear, but the way it operates also suggests its use as

therapy for anybody prone to such modern ailments as stress.

'It's amplifying changes in your skin conductivity,' says Mr Dilts. Your physical contact with the machine is made by laying two fingers on mouse-sized Galvanic Skin Response (GSR) unit that plugs into the joystick port. The rest of Mr Dilts' system is software to read the input and to run a series of demonstration programs in which, by sheer force of character, you orientate a line of dots, pilot a space-ship over an obstacle, and other exercises that under normal circumstances would be quite commonplace.

Mr Dilts' company, Behavioural

Engineering, of Scotts Valley, California (0101-408 438 5649), hopes to sell the system in the UK soon for about £100. Meanwhile development continues: 'We are working on ways of making it more controllable,' he says. This not only extends the possibilities in games, but also increases the potential of the system for revealing more about the personality and state of mind of the user.

It isn't biofeedback and it isn't exactly mind over matter. It should find a ready audience for its novelty value alone — cursor control without wires is a very strange sensation — but the long term value to the disabled should ensure that this technique doesn't languish.

Soft Thorn

Another chance to get behind small UK micro manufacturers is about to be lost as Thorn-EMI organises its move into large scale software distribution.

With outlets through a network of over 1,000 dealers and with buying power far in excess of what

most distributors can boast, the company could strike a blow for the less popular micros by encouraging software writers to cater for minorities. But when its Computer Software Distributors section opens its doors on April 2 the motto will be Safety First. Sinclair, Commodore, IBM PC... these are where the steady money lies.

This is good news for users of the

most widely used micros; Thorn-EMI should be a stabilising influence on the software business and it can hardly fail to make a lot of software more widely available and more professionally supported. But it will do nothing for owners of Lynxex, Zitas and others, who by now must be used to the wealthy and influential doing nothing on their behalf.

Labour locks into Micronet

Micronet meets the Labour Party may not be everyone's idea of a possible script, but that's exactly what is liable to be happening from August 1 onwards. The Labour Party is currently setting up a closed user group on Micronet to be used by Labour Party micro users, the idea being to speed up communications between party members and the Labour Party HQ.

Harold Frayman of *Labour Weekly* says the Micronet link will come into its own during elections. The party already sends regular mailings to local party organisations during elections, and equally expects to get information back from the grass roots, but comrade Frayman points out that a mailbox system on Micronet will make for a much faster interchange of information.

In addition, it should be possible to provide electioneering software through the telephone lines. Labour Party members already have membership and canvassing software for the Spectrum and BBC in an advanced stage of preparation, and Mr Frayman says it might be possible to download revised versions of these programs.

SOFTWARE



4-Point Graphics — multimode software.

Systems and Utilities

BBC: Clares Micro Supplies (0660 48511) has launched Beta-Base, a database management system designed specifically as a disk-based system. Hence the total size of any file is restricted only by the size of the disk drives, says Clares. With manual and demo program, Beta-Base costs £25.

IBM: 4-Point Graphics is a handsome package that first surfaced at a San Francisco show last year (Issue 36). Now it is available from P&P (0706 212321) for £149 plus VAT.

Commodore: Not a new product, but in cartridge form for the first time is BC Basic for the Commodore 64 from Kuma (07357 4335). The software, supplied in a 9K extension, costs £57.50. On a related topic Aztec Software (0924

492826) has released Turbo, an extended Basic for the 64, for £14.95.

Dragon: Sprite Magic from Merlin (Micro Systems) (0642 454883) offers control of up to 128 sprites of any size up to 1/4K of video RAM. The introductory price is £17.25. S-22 Systems (0706 59520) has released the S-22 Toolkit, a machine code programming aid for the Dragon and the Tandy Colour Computer. It has 54 commands in ten groups and is accompanied by a manual of 154 pages. It will be distributed by Ashby Computer Centre on 0724 871756. Oasis Software (0934 419921) expects to follow its Sprint Basic with a Dragon Pascal, for £14.95.

Spectrum: Timedata (0268 418121) has launched TT-S, a Spectrum programmer's toolkit which includes a relocatable Basic, a drawing program, user defined graphics, tape file header utilities, and a RAM test program. All five run with either the 16K or 48K Spectrum. TT-S costs £7.95. Kuma (07357 4335) has announced an implementation of Logo for £9.95 and a Zen Editor/Assembler for £12.50.

Apple: Software to expand memory comes from Titan Technologies via P&P in a product called Plan-Expand, designed to dovetail with Microsoft's Multiplan on

an Apple II or II+. If you have more than 80K on your system Plan-Expand will give you 33.2K of Multiplan memory. The software costs £24.95.

Various: Compushack, distributor of the Tava PC (01-935 0480) has released a communications package to run on the Tava, the IBM PC, and other IBM-compatible machines. TCP (Tava Communications Package) is intended to turn the PC into an intelligent workstation communicating by means of a DaCom Buzzbox modem. TCP alone costs £209. R:Base Series 4000, again from P&P, is a relational database for the IBM PC, Sirius, TI Professional, and DEC Rainbow, cost £459.

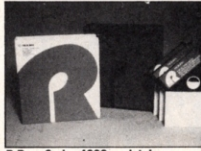
Business

Apricot: Systematics (0440 61121) has adapted its range of business software to run on the ACT micro — there are ten programs involved but conversion took just two hours, the company said.

IBM: Softsel has launched a Lotus competitor called Open Access, which combines six functions in one package. These are spreadsheet, 3D colour graphics, word processing, database and scheduler, arranged around a nucleus relational database. Open Access costs £495 plus VAT and runs on the IBM PC, XT, and

true compatibles. To contact Softsel phone 100 and ask for Freephone Softsel. Sky Software (0527 36299) has added a sales order processing module to its management accounting range. The Skymaster suite is also getting a print-spooling facility and a colour option.

Various: For BBC, Acorn, Torch and Commodore systems Hama Software (0603 616221) has established a business education section, intended to provide educational software in business studies environments. It aims to price its software at what it calls a text-book level, which in practice means prices start at about £12.50. Blandford Engineering Consultants (0538 702415) is selling a package to let you determine your lighting requirements and to show how to achieve them. For the ZX81 to the BBC B it runs on a range of systems, and costs £20 to £35.



R:Base Series 4000 — database monthful.

Vicodden's of London Bridge

6, London Bridge Walk
London SE1
Tel: 403 1988

Open
8.30-6pm
Mon to Fri
& 9.00-1pm
Sat
Closed on Satur-
days preceding Bank
Holidays

Software
Specialist

Play the Game! at Vic's prices you can't lose.

ULTI-SYNTHESIS 64
THE GREAT
QUICKSILVA

MATRIX

COMMODORE 64

ABBEX	£6.50	DURREL	Scuba Dive	£5.95
ALLIGATA	£6.95	Quest Hunt	£6.95	
Art Attack	£6.95	GAMES MACHINE		
Brands	£6.95	Fabulous Venice	£6.95	
Blingside 64	£6.95	Egypt	£6.95	
Squash/ahlog	£6.95	INTERCEPTOR		
AMROD	£6.95	Frogger	£6.00	
Atomic	£6.95	Krazy Kong	£6.00	
Coasic Commando	£4.95	Planit	£6.00	
Headup	£6.95	London G Bert	£6.00	
Moon Buggy	£6.95	Defender 64	£6.00	
Galaxy	£6.95	Arjen City	£6.00	
30 Time Trek	£6.95	Arjen City	£6.00	
Artic	£6.95	Vortex Racers	£6.00	
Starline	£6.95	Houses of Karn	£6.00	
KONG	£6.95	Assembler 64	£6.00	
Membership	£6.95	China Miner	£6.00	
AUDIOGENIC		AGINE		
Motor Manual	£7.95	Arceball 64	£4.50	
Bonzo	£5.95	LEVEL		
Q Master Chess	£19.95	London Time	£6.95	
BIG-G		Snowball	£6.95	
Meat	£5.95	Colossal Adv	£6.95	
BUBBLEBUS		LLAMASOFT		
Extremator	£5.95	Mazezone	£6.60	
Huster	£5.95	Hover Blower	£6.50	
Kick Off	£6.95	Mutant Camels	£6.50	
Wings a Revenge	£6.95	Revenge Games	£6.50	
BUG-BYTE		Colossal Adv	£6.00	
Viking Yaks	£6.50	MELBOURNE HOUSE		
DK THRONES		Gungy Horace	£4.95	
3D Tahn	£6.95	Hobbs 64	£12.95	

VIC-20

AMROD	£4.95
Dark Dungeon	£4.95
Star Defender	£6.95
AUDIOGENIC	
Bonzo	£6.95
Amok	£5.95
DURREL	
Quest Menzard	£6.95
IMAGINE	
Acadix	£4.50
Bewitched	£4.50
Catcha Snatcher	£4.50
Wacky Waters	£4.50
INTERCEPTOR	
Falon Fighters	£5.00
Klaxon Kong	£5.00
LLAMASOFT	
Lazerzone	£5.00

ORIC-1

DURREL	Harrier Attack	£5.95
UK	Zorgina Revenge	£7.50
LEVELS		
Colossal Adv	£6.95	
LOTHORIEN		
Two Gort Turles	£5.95	
MELBOURNE HOUSE		
The Foot	£12.95	
OCEAN		
Mirrimpy	£5.95	
Hunchback	£3.90	
Island of Death	£5.90	

QUICKSHOT JOYSTICKS

Commodore/Atari	£10.95	QuicksHOT II	£12.95
Spectrum with Interface	£19.95		£21.95
Oric with Interface	£24.95		£26.95

We also stock a wide range of hardware. Please call in and see.

FREE

HOW TO FIND US

Access, Visa, Trustcard & Creditcharge orders can be accepted by post or by telephone on 01-403 1988, during normal working hours. There is no surcharge on any credit card orders.

ALL MAIL ORDERS to 6 London Bridge Walk, London SE1 2XK

INSTANT CREDIT UP TO £1000

Want to update your hardware? We'll give you up to £1,000 Instant Credit, plus Part Exchange. Just call or write for details.

For the full list of titles see Appendix

AT&T AT&T

BBC Model B

ZX-SPECTRUM

AAF SOFTWARE	£5.90	CP SOFTWARE	£6.95
Chuckle Egg	£5.90	Backgammon	£4.95
Jungle Fun	£5.90	Bridge Player	£7.95
ABBEX		Bridge Tutor (A&B)	£4.95
Kobata	£4.95	Bridge Tutor (B&G)	£4.95
ADDICTIVE GAMES		Pitfall Wizard	£4.95
Football Manager	£5.95	CRIL	
ADVENTURE INTERNATIONAL		Handicap Golf	£4.95
Voodoo Castle	£6.95	Top Match	£4.95
Prize Adventures	£6.95	Delity Day	£4.95
Adventureland	£8.95	Top Match	£4.95
AMROD		Missile Defence	£4.95
Starline	£6.95	Rommel's Revenge	£5.50
Diab Dab	£4.95	Invader Bodymen	£5.50
Keno II	£5.95	Hall of Things	£6.95
ARTIC		Dungeon Master	£6.95
Beast Blower	£4.95	DIGITAL	
Snooper	£4.95	Figure Plot	£6.95
Dimension Dest	£4.95	Night Courier	£6.95
AUTOMATA		DIGITAL FANTASIA	
Pinnaco	£8.00	Golden Baton	£6.95
Grocho	£5.00	Time Machine	£6.95
Go To Jail	£5.00	DK THRONES	
Morris Bikers	£3.00	Macbeth	£4.95
Ph-Eyed	£5.00	Starline 3000	£2.95
Yakine	£4.00	DDIC	
Bunny-Eye	£4.00	Macbeth Cave	£6.95
BUG-BYTE		DURRELL	
Aquas	£4.95	Scuba Dive	£6.95
Pool	£4.95	Jungle Trouble	£4.50
Cavefighter	£4.95	Harrier Attack	£4.95
Slye	£4.95	FANTASIA	
The Castle	£5.95	Pyramid	£4.95
Birds and Bees	£4.95	Doomsday Castle	£5.95
CARNEL		GAMES MACHINE	
Back Crystal	£6.50	Small	£6.95
Volcanic Durg	£4.50	HEWSON	
Adv of Beasts	£4.50	Nightlife II	£5.95
Devil Ridein	£4.95	3D Starboard Attack	£4.95
The Crypt	£4.50	Starboard II	£4.95
Starboard I	£4.95	Worth of Magg	£10.50
Worth of Magg	£10.50	IMAGINE	
Alchemet	£4.95	Stonkers	£4.50
Gangsters	£4.95	Stonkers	£4.50
Punks	£4.95	Zoom	£4.50
Smuggler	£4.95	Zoo Zap	£4.50
Byte	£4.95	Acadix	£4.50
Carnel	£4.95	Jumping Jack	£4.50
CDI			
Magic-Meanies	£4.95		
3D Printer	£4.95		
Spect Safari	£4.95		
		French Mistress A	£6.95
		French Mistress B	£6.95
		LEVEL	
		Colossal Adv	£6.95
		Snowball	£6.95
		Lord of Time	£6.95
		M&M	
		Dictator	£4.90
		O-Man	£4.90
		Man in the Hat	£4.90
		3D Munchie	£4.90
		OPUS SUPPLIES	
		Amazon Space	£6.95
		Dogfight	£6.95

There's MORE at historic, picturesque London Bridge Walk than Vic Odden's friendly service, wonderful prices, wide choice and staff so expert they possess disk drives for brains. NOW there's a FREE TAPE with every software cassette purchased before April 31st. Store your favourite programs courtesy of Vic Odden! (But remember, this offer is only valid on production of this advert).

VicOdden's MAIL ORDER SERVICE

All mail order & phone enquiries to 6 London Bridge Walk 403 1988

Name _____
Address _____

Mail Order **POST FREE!**

Prices correct at time of going to press E&O All offers subject to availability

IBM sinks CP/M

CP/M is sinking below the horizon as the rush to IBM compatibility overwhelms software producers.

At the first Softcon micro software show at New Orleans IBM was confirmed as the pace-setter in software trends by sheer weight of numbers. PC DOS and related operating systems are the ones that are commanding the software developers' attention.

The main exception at Softcon (which lived up to its name only in that exhibitors found themselves showing their products to each other, rather than to dealers) was Apple's Macintosh.

MicroPro, Visicorp and Digital Research stayed away but there were still about 1,400 exhibitors at the show, and enough products to hint at the ways that micro software is developing.

The style of integration that Lotus 1-2-3 pioneered (the product was demonstrated at Softcon on the Mac and the Tandy Model 2000) has been followed by imitators and expanded by other suppliers. In particular, where an integrated package interfaces with a database, the trend is towards ease of use that in some cases relies on the precepts of artificial intelligence. In other words, what have in the past been different branches of development are coming together to make life easier for micro users generally.

The extent to which to PC dominated the show is clear from one visitor's estimate that 75 per cent of the products shown were PC compatible. This was the first Softcon; at Comdex shows in years gone by Apple and CP/M have had this kind of dominance.

Alongside IBM's dominance come the inevitable big businesses. Much of the most visible PC software was concerned with communications links to mainframes, and the most visible exhibitors were the likes of Management Science America.

The Mac software on show included Software Publishing's PFSA: file and report and the Helix database from Odesta. Microsoft also had Chart and Graph on the Mac.

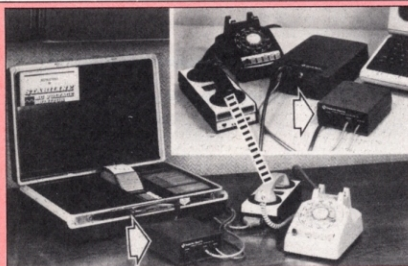
But the other main trend apparent from Softcon again points in the direction of large businesses and corporate users, and away from the more familiar world of personal computing. Multi-user versions of popular systems are on the way and Ashton-Tate's dBase II is up there with the leaders.

Upgrade set to beat Acorn to Z80 board

Upgrade Technology is the latest company to beat Acorn to the mark by releasing a Z80A second processor for the BBC.

The Upgrade is compatible with both BBC Model A and B, and incorporates a 64K of dynamic RAM, a disk controller, CP/M 2.2 (the real CP/M, supplied on disk) and a built-in power supply. The whole package costs £263 and should be available from the end of April.

An expansion bus allows you to bring the RAM up to 256K, add new interfaces, hard disks, and stereo sound to your BBC. And all of this without losing the BBC's graphics capabilities like Osbyte and Oswald. Contact Upgrade Technology on 01-451 4414.



JAGGED LINE — No self-respecting micro should be without one. A Stabiline line voltage monitor, that is. Just the ticket for detecting, measuring and recording voltage excursions, spikes, sags, surges, transients and brown-outs. And with the optional remote connection you can do immediate on-site analysis of someone else's mains supply. Mind you, if you want to cure your mains supply of all these afflictions you will have to buy one of the wide range of Stabiline mains conditioning devices. Further details from Danesbury Instruments 07073-38623.



The fourth dimension comes into play in Audiogenic's Forbidden Forest.

Audiogenic blazes 4D trail

After Forbidden 3D you might think Forbidden Forest 4D for the Commodore 64 would be tame by comparison.

Audiogenic will have none of it. 'The only game to really take the Commodore 64 into a new dimension' it trumpets. The fourth dimension, incidentally, is time — the action takes place in a scrolling forest-scape with day imitating

reality by turning eventually into night.

The hero must face the usual bey of beasts on his way to slay the Demogorgon, but Audiogenic isn't saying whether he is scared of the dark into the bargain.

The game is disk-based and costs £12.95 from high street stores, Audiogenic dealers, or the company at PO Box 88, Reading Berks.

Acorn — is it generous to a fault?

Acorn, a company with a wealth of experience of the start-up problems facing a small company (in Acorn's case this seems to have miraculously continued well into its career as a large company) is to get into largesse dispensing.

Chairman Hermann Hauser has

announced the company's intention to set up a venture capital fund to aid young high-tech enterprises, probably have difficulty getting investment from conventional sources, and that therefore exciting new products appear late, or perhaps never even see the light of day.

Might we suggest Dr Hauser looks no further than the division of Acorn that seem to be having trouble developing the Z80 second processor, Level Two Econet and peripherals for the Electron? They're in the Cambridge area.

BBC summed

One of the BBC's disadvantages for use in schools and colleges is the lack of advanced mathematical functions in its Basic.

Brainstorm Computer Solutions (01-263 6926) will shortly come up with an answer. It plans to launch a maths ROM that adds a wide

variety of mathematical functions to Basic commands, including trigonometric functions and matrices.

The software in the ROM is designed to avoid the need to switch in the ROM using a 'star' prefixed command. Instead, it provides an extension to the usual Basic commands.

The ROM should be available in about six weeks at around £30.

Watson micro homes in

By Ralph Bancroft

A British company is attempting to make an entry into the low cost CP/M micro market with the Rade Z80 board.

Watson Computers (01-352 0343) is launching the Watson W40 at a price of £1,250 plus VAT within the next few weeks.

It uses the Rade Z80 board with 64K of RAM (Issue 20) and comes complete with keyboard, 12in monitor, two RS232 ports, two Centronics parallel ports and twin 0.5Mb 3½in microfloppies. CP/M is included in the price but there is no bundled software.

An added attraction of the machine is that two days training and a 12-month warranty (immediate machine replacement) are included in the price.

The use of the Rade board should ensure there are none of the usual problems that accompany the launch of a new machine.

The board is a relatively mature product that has been used in a number of other British micros.

It also opens up the prospect of upgrading to a 16-bit machine in the future as well as extra memory capacity. Rade is currently working on an 8088 board.

CHROMASONIC

PERSONAL COMPUTERS

48 Junction Road, Archway, London N19 5RD.

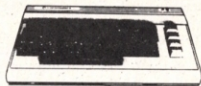
Tel: 01-263 9493 and 9495.

Also at 238 The Broadway, Muswell Hill, London N10

Tel: 01-883 3705

Executive 64 PORTABLE COMPUTER

including free software. Easyscript + Games + Easy-stock and Easyfinance. Special offer price **£795.**



e Commodore 64 computer	£195.95
e 1541 disk drive (170K)	£195.95
e MPS 801 matrix printer	£195.95
c C2N cassette unit	£39.10
a Quickshot joystick 2	£10.50
e 1520 printer plotter	£149.95
e 1526 dot matrix printer	£295.00
f 1701 colour monitor	£195.95
b Z80 CP/M cartridge	£50.00
b Speech synthesiser	£49.50
a Microguide	£5.95
c Petspeed	£50.00
b Intro. to Basic Part 1 and 2	£14.50
b Simons Basic by Commodore	£50.00
b Easyscript (wordprocessor)	£75.00
b Easyspell (spelling checker)	£50.00
b Vizawrite (wordprocessor)	£88.00
b Vizawrite/Spell	£85.00
b Sales ledger by Anagram	£75.00
b Purchase ledger by Anagram	£75.00
b Stock control	£113.85
b Superbase 64	£88.00
b Wordcraft 40 on cartridge	£89.95
c Calc Result 64/SX64	£99.00
c Calc Result Easy 64/SX64	£49.95
b Bridge 64	£29.95
b Mon 64	£39.95
c Programmers reference guide	£9.95
b Omnicalc	£50.35
b Multiplan	£69.95
b Zork I, II or III	£28.75
b Deadline	£35.95
b Suspended	£35.95
b Flight Simulator II	£35.95
b Robbers of the Lost Tomb	£17.95
b Hobbit 64	£14.95

Commodore 64 packs

64 STARTER PACK

Commodore 64
C2N cassette deck
Intro to Basic (part 1)
Quickshot joystick
Game of our choice
Only £255.00
+£9 p&p

64 BUSINESS PACK

Commodore 64
1541 disk drive
MPS-801 printer
Free Easy Script
Box of disks + box of paper
Only £629.00
+£16 p&p

64 BEGINNERS PACK

Commodore 64
C2N cassette deck
Only £229.00
+£8 p&p

64 HOME/BUSINESS PACK

Commodore 64
1541 disk drive
box of 10 disks
Only £395.00
+£12 p&p

64 PROFESSIONAL SYSTEM

Commodore 64 computer
1541 disk drive
Daisywheel printer
Phillips 12in green screen monitor
All connecting cables
Easyscript; wordprocessing program
Superbase — Database program (Easyscript and Superbase linked together)
Box of paper and box of diskettes
£950

BBC

e BBC Model B computer	£399.00
e BBC Model B with disk interface	£469.00
e BBC Model B with Econet interface	£446.00
e BBC Model B with disk and Econet interface	£516.00
Disk interface (price includes fitting)	£97.00
Econet interface (price includes fitting)	£70.00
Speech interface (price includes fitting)	£55.00
a Microguide (Keyplate)	£5.95

DISK DRIVES

CUMANA DISK DRIVES

e CS100 Single sided 40Tr100K	£217.35
e CS200 Single sided 80Tr200K	£263.35
e CS400 Double sided 80Tr400K	£297.85
e CD400S Dual single sided 80Tr400K	£539.35
e CD800S Dual double sided 80Tr800K	£603.75

TORCH Z80 PACK

2 x 400K (formatted) floppy disk drives
Z80 second processor
and the following FREE software
Perfect Writer Perfect Speller
Perfect Filer Perfect Calc
Only £795.00
+ 8.00 p&p

CD drives can be switched to 40Tr mode. All Cumana drives are supplied in beige cabinet, have their own power supply, connecting cable, format disk and user's manual.

PRINTERS

f RX80 (Tractor only) Dot matrix	£259.95	f FX100 (Friction & pin feed) Dot matrix	£545.95
f RX80FT (Friction & Tractor) Dot matrix	£299.95	f Shinwa CP80	£228.85
f FX80 (Friction & pin feed) Dot matrix	£399.95	f Daisystep 2000 Daisy Wheel	£329.95
		f Juki Daisy Wheel	£415.95

MONITORS

Commodore 1701 Colour and Sound

f Microvitec 14" Colour	£195.95
f BMC 12" Green screen	£247.25
c Turntable stand for BMC	£113.95
f Philips Green screen	£19.55
f Fidelity RGB, RGBY, Composite and Sound	£79.00
	£228.85

MEDIA SUPPLIES

Disquettes by Verbatim (supplied in boxes of 10)
b S.S.D.D. 40Tr £17.95 b D.S.D.D. 80Tr £22.75
b S.S.D.D. 80Tr £24.75 b Plastic library case £1.35
b C15 cassettes 50p each or 10 for £4.50
Computer paper (supplied in boxes of 2000 sheets)
d 11x8. £13.85 d 11x9 £12.65 d 11x15 £15.52
Sorry p&p paper £3.00 a box

Printer Ribbons	£1.85	b 1515/1525	£8.21
b Juki	£3.00	b Daisystep 2000	£5.52
b Epson	£3.00	Dust covers: All codes a	
		b C2N	£1.85
BBC	£2.95	64VIC 20	£2.95
Single disk	£2.95	1541	£1.95
Dual disk	£3.95	1525/GP1002	£9.00
		FX100	£4.95
		Dragon	£2.95

Phone or send for our latest details of our range of products which is far too large to put into this advert. Besides the complete range of Commodore and BBC we also stock all the latest software and books for the 64, VIC, BBC and Dragon.

We guarantee all our products for 1 year (on 64 and VIC 2 years). Payment may be made by Access, Barclaycard, Bankers Draft, Building Society cheque or cash. Sorry, cheques need 4 day's clearance. Postage and packing: see codes. ALL PRICES ARE INCLUSIVE OF VAT.

WE RESERVE THE RIGHT TO ALTER PRICES WITHOUT PRIOR NOTICE

Postage codes a=£0.65, b=£1.00, c=£2.00 d=£3.00, e=£8.00 (Securicor) f=£14.00 (Securicor)

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the fortnight up to March 8. The games chart is updated every other week.

Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include VAT.

Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month.

PCN Charts are compiled exclusively for us by RAM/C, who can be contacted on 01-692 6596.

GAMES

No.1



		GAME TITLE	PUBLISHER	MACHINE	PRICE
▲	1 3	Fighter Pilot	Digital Integ	SP	£7.95
▼	2 1	Checkered Flag	Psion	SP	£6.95
▼	3 2	Manic Miner	Projects Bugbyte	SP, 64	£7.95
▼	4 5	Scuba Dive	Marlech Durell	SP, 64, OR	£6.95
▼	5 4	Atic Atac	Ultimate	SP	£5.50
▼	6 6	Ant Attack	Quicksilva	SP	£6.95
▼	7 7	Hunchback	Ocean	SP, 64	£6.90
▲	8 11	Flight	Psion	SP	£7.95
▲	9 19	Wheelie	Microsphere	SP	£5.95
▲	10 16	Stonkers	Imagine	SP	£3.95
▲	11 12	Chinese Juggler	Ocean	64	£6.90
▲	12 15	Lunar Jetman	Ultimate	SP	£5.50
▲	13 10	Hobbit	Melbourne	SP, AC, 64	£14.95
▲	14 22	Jet Pac	Ultimate	SP, VIC	£5.50
▲	15 24	Fred	Quicksilva	SP	£6.95
▲	16 30	Pool	CDS	SP	£5.95
▼	17 8	Rev. of Mut. C's	Llamasoft	64	£5.95
▼	18 —	Blue Thunder	Richard Wilcox	SP	£5.95
▼	19 9	Alchemist	Imagine	SP	£6.50
▼	20 14	Mr Wimpey	Ocean	SP, 64	£6.90
▼	21 13	Death Chase	Micromega	SP, 64	£6.95
▼	22 —	Bugaboo	Quicksilva	SP, 64	£7.95
▼	23 27	The Snowman	Quicksilva	SP	£6.95
▼	24 28	Blogger	Alligata	64	£7.95
▼	25 17	Skull	Games Machine	SP	£6.95
▼	26 —	Pinball Wizard	CP Soft	64	£5.95
▼	27 18	Space Shuttle	Microdeal	SP, AC, 64, VIC, DR, OR	£8.00
▼	28 —	Night Gunner	Digital Integ	SP	£7.95
▼	29 —	Horace & Spid.	Psion/Melbourn	SP	£5.95
▼	30 —	Twin King, Vall.	Bug Byte	AC, 64, VIC	£9.50



MICROS

Top Ten up to £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▶1	(1)	Spectrum	£99	(SI)
▲2	(3)	VIC 20	£140	(CBM)
▼3	(2)	CBM 64	£229	(CBM)
▲4	(6)	BBC B	£399	(AC)
▼5	(4)	Dragon 32	£175	(DD)
▲6	(8)	Atari 600XL	£150	(AT)
▶7	(7)	Oric 1	£99	(OR)
▲8	(10)	Apple IIe	£750	(AP)
▼9	(5)	ZX81	£40	(SI)
▼10	(9)	Electron	£199	(AC)

Top Ten over £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▶1	(1)	IBM PC	£2,390	(IBM)
▶2	(2)	ACT Sirius	£2,525	(ACT)
▲3	(5)	ACT Apricot	£1,760	(ACT)
▶4	(4)	Apple III	£2,755	(AP)
▼5	(3)	DEC Rainbow 100	£2,359	(DEC)
▲6	(—)	Olivetti M20	£2,180	(OL)
▲7	(8)	Wang Professional	£3,076	(WANG)
▲8	(9)	NCR Decision Mate V	£1,984	(NCR)
▼9	(7)	Kaypro 10	£2,595	(CKC)
▼10	(—)	Data General Ent 1000	£2,645	(DGL)

Keyboards are a catastrophe

Why do so many computer manufacturers get the design of their computer keyboards totally wrong? I have to work all day on a BBC Model B, and the shortcomings of the keyboard (and in part the system) are so glaringly apparent that anyone seeing the layout at the design stage must surely have reported them many times over.

I have used typewriters for years, and thought (naively as it turned out) that computer keyboards would just prove one step along the same road.

I started with a 16K Tandy TRS-80. The small differences encountered here were no real trouble.

Then Beeb, and a bad attack of the screaming heebie-jeebies on discovering Shift Lock (an unnecessary key and a positive embarrassment) in very much the wrong position, just where a straying left little finger can catch it typing fast.

I quickly realised that, for a typist, the vital Caps Lock key was in exile where the only occasionally used Ctrl key should properly have been. How easy to reverse these so that the Caps Lock key came in its natural place above the left shift. How, I wonder, could this arrangement ever have been countenanced?

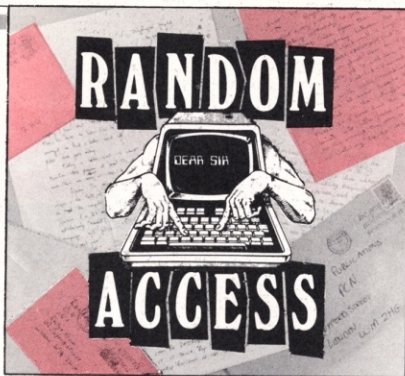
PCN £10 Star Letter



But I have yet to see anyone complain of the real curse of the Beeb — the necessity to enter all Basic keywords in upper case letters, meaning any work using lower case letters leads to constant case-shifting on a mind-bending scale. Did the designers really feel the millions of variables available in either case needed duplication? How many am I expected to need for a 32K program when I could fill the memory a hundred times over just naming available variables in either of the cases? This reading of upper and lower case variables and keywords as different merely makes my work more tedious.

A third failing of the machine is the missing number pad.

With a hundred years of good solid typewriter technology behind them it should not be difficult for keyboard designers to find a logical layout for computer keyboards. Yet space and shift are frequently separated by extraneous keys, space bars are too short, Ctrl keys keep creeping into the qwerty, pound signs are either missing or hopelessly placed, quotes and apostrophes move randomly, and so on.



Don't carry a LOAD on your shoulders, unburden yourself on PCN's letters page.

My hollow (nay, wry) laughter reverberates whenever I read 'it has a standard qwertz layout, but...'

*P A S Craddock,
Rowley St, Walsall*

Hobbit hacker at your service

After four weeks of hard, tortuous work I have finally completed the Hobbit. First, I scored 102.5 per cent, can you explain this?

Second, if any reader is stuck at any point on the Hobbit I would be glad to help them out. Just phone Uckfield 3630 or write to: 5 Browns Lane, Uckfield, East Sussex, with a stamp addressed envelope enclosed.

Third, has anyone else managed to beat my score in four weeks?

*Paul Rogers,
Uckfield, E Sussex.*

Sorry Paul — can't explain the 100+ per cent... but if any fellow enthusiast can, let us share your secret — Ed.

Commodore's 'slow' drives are adequate

J Gardner of Burton on Trent, was in some doubt about buying a disk drive for his CBM 64 (Issue 51). As a recent but satisfied user I recommend him to take the plunge.

I have read and listened to the many comments about the 1541 being 'slow'. Perhaps it is in comparison to some others, but no one ever seems to be able to give me a satisfactory answer as to just what they do with all the time they save using other drives. My set-up is strictly for home use. I have no mammoth projects that demand minimum 'down-time' and where every second is costing millions, so my 'slow' drive suits me very well.

As for R Gardner's comments about back-up copies, I am sure there are ways of achieving his

objective, for legitimate purposes, (after all, we are not all pirates) but they take some finding. I don't suppose there will be too many in print either.

So, Mr Gardner, I say again, take a chance. If you feel you want to pursue the matter further, drop me a line.

*R Medford,
7 Thorn Grove,
Hale, Altringham,
Cheshire WA15 9AW*

Business software new sales strategy

Although my company is not directly involved in the sale of micros, we have a consultancy service for individuals or companies with specific applications they wish to resolve using micros.

Normally this presents no difficulty, but recently I have found myself in a very embarrassing position because of the trading practices of some software companies.

A client has a need for a particular task for which I recommended a BBC Micro running selected software. Not unreasonably, my client wishes to see the machine running this software, the major part of which was to have come from Acornsoft's new range of business programs. But when I contacted it to arrange a demonstration, I was told that these programs — which have been advertised for some time — would not be available for another month and that even then they may not reach distributors for some time!

Software for All was more helpful but its marketing company told me it was not its practice to provide demonstrations or demo tapes. The only way to see the goods is to buy them and return them within 30 days if they are not satisfactory. Furthermore, only one such arrangement could be made at a time, which is totally useless to a

client who wants to compare various packages.

When will these people come to their senses? The best and truest lesson I have ever learned in this business is one which should be carved in letters of gold in the office of every package supplier in the country — *Software Sells Hardware*.

There are simple rules which must be kept by anyone who hopes to succeed in providing packages for business users:

■ Make your product available. Mail order is just not good enough for business users.

■ Provide adequate advertising — not glossy blurb but concise and clear information.

■ Be prepared to provide demonstrations or make arrangements to allow prospective buyers to take products for a trial period.

■ Make sure documentation is full and is available separately from the package. Be prepared to give advice and help.

*Mark A Preston,
White Oak Information Technology Services, Whitworth, Lancs.*

Has the Ministry of Defense gone mad

I am writing about the seizing of the anti-duplication device manufactured by JLC Data of Barnsley, by the Ministry of Defense.

Has the MoD gone mad? According to the *Daily Telegraph*, the device is for preventing piracy on cassette tapes.

I think it fairly safe to assume that anyone who is likely to come under the scrutiny of the MoD would at least use floppy disks for backing store. Surely the MoD can't be interested in what Joe Public stores on his tapes.

The *Daily Telegraph* article says the device could be used by Russians — woe betide any Russian who gains access to my cassette tapes.

I pity the managing director of JLC Data, Mr Jim Lamont, who was forced to hand over all documentation and forbidden to disclose any technical details of the device, with the threat of a fine or imprisonment.

*Andrew Chard,
Cranleigh, Surrey.*

But Mr Lamont is too wise to lose all. As we report in Issue 51, he has more up his sleeve — Ed

Don't knock the shop assistants

I was very interested to read P Smith's letter (Issue 50). In fact, I agree with all he says apart from the last two paragraphs.

As I tried to explain in issue 43, the High Street shops may well not be specialists, but speaking on behalf of my workplace (Co-op) I disagree totally. There is not a

shop I know of in my town that has not employed someone knowledgeable in computers (something that is not done for selling other electrical goods.)

As for Mr Smith's comment that High Street shops are not able to spend 30 minutes to find a fault, he is wrong on two points:

● I would have been able to tell it was a cassette recorder fault after five minutes of testing, as I have done many a time before.

● If necessary, I would spend 30 minutes finding the fault, again something I have done.

As a final note I would like to know where Mr Smith bought his micro and whether it suits his needs fully.

If he bought from a specialist shop and finds it insufficient, I rest my case. It's up to a salesperson to find out the needs of each customer. But remember, if you don't ask for help you won't get it.

Marcus Dawson,
Corby, Northants.

Sinclair's antics are good for a giggle

I have been amused by ads in PCN for Sinclairs' QL micro. At the top of the page is the line 'There's no comparison chart, because there's no comparison', a fairly common advertisement claim. But at the bottom, on the order form, there's a box to tick for a QL brochure and another for 'a chart comparing the Sinclair QL with a —!'

I am also surprised at the number of people waiting for a Microdrive Order Form, an almost mythical piece of paper. I have received two! They arrived within days of each other (one envelope also contained a June 1983 edition of Sinclair's software catalogue).

Finally, I have a suggestion for all those awaiting QL delivery: why not learn how to touch type on one of the glossy embossed QL brochures which Sinclair has distributed. By May, or whenever it arrives, you should be quite proficient.

Guy Boulton,
Telford, Shropshire

PCN accused of being unfair to Oric

I am an independent supplier of software for the Oric and I feel PCN seems to be taking every opportunity to take digs at the company. It seems strange a company can bring out an improved version of a machine to put right virtually all the inherent faults, let software companies know some considerable time beforehand, and not charge extra for the machine, while still being castigating for the effort by the likes of PCN.

Maybe you have conveniently forgotten about Sinclair, who changed the machine without telling anybody. An 'Issue 2' Oric is at

least recognisable as such, and contrary to Issue 51 has no problems and is available. On the other hand, Sinclair can bring out the barest machine that people will buy and he is heralded as the New Messiah!

At least Oric admits the ROM wasn't all it should have been and corrected it. The review of the Atros said as much and was well balanced and fair—why spoil it by a couple of scrawled lines by someone who obviously dislikes Oric as much as you do?

PJ Isherwood,
Warrior Software, Swansea

Joysticks work with Currah speech unit

In Issue 51, Bob Chappell says: 'A drawback with the speech unit is that it cannot be used with a joystick'. Wrong, Mr Chappell.

I own a programmable AGF interface and a Currah Speech Unit, and the two work together brilliantly. Any game which is programmed to use the Currah Speech Unit works when plugged into the male port on the back of the AGF interface.

S G Lang,
London SW11

Quite right, Mr Lang. It's all a matter of technique! Ed.

A multitude of micros

I am the computer technician at a college of further education, where we have BBCs with and without disk drives, PET 4032s, Apple IIs, an HP 9836, a Wang System 5 word processor and three Alpha Micro 1020 multi-user systems which have Elbit, ADDS Regent, ADDS Viewpoint and Alpha AM60 (Wysely 100) terminals.

To take Mr Smith's points (Issue 52):

a The above computers and terminals are nine variations on a standard layout. Even two types of ADDS terminals have different layouts.

b What operating system does Mr Smith want? For a really superior one he should try an Alpha Micro with the AMOS system.

c I would hate to estimate the number of dialects of Basic in use, but it must be several hundred. Sinclair Superbasic seems a comprehensive implementation of the gauge. Does Mr Smith want mediocrity as a standard?

d How many different formats, sizes, single- or double-density, single- or double-sided, soft- or hard-sectored standards exist for floppy disks? The recent rash of microfloppies has increased the confusion. On how many machines is it possible to take a program disk and run it on another machine of different manufacture, with complete compatibility?

As far as access time is con-

cerned, the recent trial of a floppy-based CP/M80 portable seemed to take a not longer than seven seconds to access its disks. Certainly the cost of Microdrive cartridges seems high, but surely a twin floppy-based QL would cost 40% to 50% more.

Given the chance of a BBC or waiting for a QL, I know what I would do. The BBC is good, but seems expensive, and still many of its promised extras are not available. Is Econet ever to be fully implemented?

If any manufacturer wants low cost advertising, how about donating machines to colleges of further education?

Alan Chapman
Wesford, Northampton.

Insider's view of new 6502

With reference to Mr B Taylor's letter (Issue 48) I would like to amplify on what was said about the R65CO2 processor.

I work for a Rockwell distributor, RCS Microsystems, selling this processor, and I would like to make the following points.

1 The processor is totally pin-compatible with the normal R6502, although a 2MHz version will not be available until about June. However, some 1MHz parts will work at 2MHz and I have successfully used a R65CO2 in a BBC Micro.

2 The main problem, of course, is that existing assemblers do not cover the extra instructions required, although on the BBC Micro procedures could be defined to cover this.

3 Extra instructions are:

BRA	Branch Relative Always
DEC	Decrement Accumulator
INC	Increment Accumulator
PHX	Push X on stack
PHY	Push Y on stack
PLX	Pull X from stack
PLY	Pull Y from stack
STZ	Store Zero
TRB	Test and Reset Memory Bits with Accumulator
TSB	Test and Set Memory Bits with Accumulator
BIT	Test Immediate with Accumulator
BBR	Branch on Bit Reset
BBS	Branch on Bit Set
RMB	Reset Memory Bit
SMB	Set Memory Bit

On some existing instructions the range of addressing modes has been extended. These fill in the gaps in the NMO5 R6502 instruction set. Sequences such as: TXA, PHA, can be replaced by: PHX, giving a 50% saving of memory and time.

4 To replace a R6502 in your own computer, check what speed it runs at. A BBC runs at 2MHz, the 6502 will probably run at a R6502AP, the A denoting the speed. You will need to purchase a R65CO2AP.

R65CO2P1 = 1 MHz = R6502P
R65CO2P2 = 2 MHz = R6502AP
R65CO2P3 = 3 MHz = R6502BP
R65CO2P4 = 4 MHz

The 'P' denotes plastic package.

S N Taylor,
Customer liaison engineer,
RCS Microsystems Ltd.

Software: a summing up

We are concerned that two comments of our tape Adding & Subtracting (Issue 49) will give a false impression.

In Adding, the sum displayed refers to blocks loaded onto a train. The numbers appear below the trucks as the child enters them. The statement that in each program the written sum does not correspond to the picture displayed, we can only imagine refers to the very brief moment while the train scrolls off leaving the sum on screen together with the unused blocks. It seems a large step from here to the statement that the screen does not correspond to the sums, particularly as in all our school trials this was never once a problem with any child. We can similarly support the other programs.

Your reviewer says that no programs include the concept of zero and also seems to imply in a critical way that Ducks is 'great fun for those already confident and competent in manipulating numbers'. This is exactly what we intended it to be.

Adding and Subtracting are programs to develop basic skills and Ducks is meant to be an extra program where children can use their skills and learn about the concept of zero which would have been difficult earlier.

It is possible to do 12 - 12 = 0, then no ducks would be left in the river. It is quite clear, in our experience, that the total number refers to the number of ducks in the river. Incidentally, there are always 20 ducks on screen, the example your reviewer gave is quite impossible.

Perhaps also your review of Mirrorsoft 'Quick Thinking' might have mentioned this was also written by Widgit.

Tina Detheridge,
Widgit Software, London N2

There are, of course, different theories on education, and the comments made in our review, compared to Ms Detheridge's reply, show how different these can be. We take the point about Ducks and about Quick Thinking. We'll argue the rest. —Ed.

Share your thoughts in the UK's liveliest micro weekly letters columns. Funny, feisty or fanciful, your letter could win you £10 if it's of star status.

WRITE TO: Random Access,
Personal Computer News,
VNU, Evelyn House, 62
Oxford Street, London W1A
2HG.

Lost in a maze of bits and bytes, trapped in a forest of errors, bugged by Basic? Whatever the problem, CALL on us. Our panel of experts is at your command.

Write to: Routine Inquiries, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2XG.

GRAB a load of Oric numbers

Q I have some queries about my Oric 1. How do I save variables, with or without a program, to tape?

I don't understand the keywords GRAB and RELEASE — have they got something to do with user RAM?

From where can I get a complete list of ROM routines? *O Jorgensen, Give, Denmark.*

A You can't easily save variables to tape with an Oric: the nearest you can get is to save a block of memory between two addresses.

To save variables with a program, you'd break into the program, then save a block of RAM, from address #500 (which is where Basic programs begin) up to the end of the data storage area eg #97FF — HIMEM on a 48K machine (#17FF for 16K). This would be done with CSAVE "PROGRAM", A#500, E#97FF.

When you load the file, you'd use GOTO (line number) to run the program; don't use RUN as this clears all variable values and 'erases' dimensions etc. You'd also have to ensure that you don't GOTO a line number with a DIM statement in it, or you'll get a redimensioned array error message.

To save variables only, you'd have to work out exactly where in RAM they were, then save that block. You could use an array-saving routine such as the one published in Oric User, issue 2 — contact Tansoft, Units 1 & 2, Techno Park, Cambs.

Yes, folks, 'tomorrow's micro today' — the Oric — can't save data to tape, and the Atmos can save only arrays; no file commands are provided, not even on the forthcoming disk system.

As you suspect, GRAB and RELEASE deal with the allocation of user RAM. GRAB takes the RAM area normally reserved for the hi-resolution screen, allowing it to be used for user programs and/or data storage. RELEASE does the reverse;

it allows the memory area taken by GRAB to be used for graphics.

So, if you want to enter a long program which uses a lot of variables, but doesn't use graphics, you would be well advised to put GRAB in the first line.

So far as ROM routines go, very few manufacturers are prepared to release information about ROM routines, and Oric Products International is no exception. Some books, such as Bob Maunder's 'The Oric Companion', contain details of some of the routines, and PCN published a number of articles in issues 31 and 33 to 35 which may help.

The case of the mystery modem

Q I recently heard on the radio a leading authority on computers talking about a certain add-on. He claimed that with this piece of apparatus, which consisted of some sort of telephone receiver, he could extract data from thousands of micros nationwide.

He claimed that, for the cost of about ten dollars, you could link up to Cefax and big American machines. Though I'm not sure of the name of this system, I did hear the name 'On Line' mentioned. This certainly sounds like a refreshing alternative to Acorn's own Teletext adaptor (for the BBC micro — of which I am an owner). Please could you give me any information whatsoever to do with 'On Line'. I am intrigued.

Richard Hewitt, Bristol.

A There are a number of confusing points here which point to some common false impressions about micro-to-micro communications. First of all, a system which uses 'some sort of telephone receiver' isn't likely to be receiving Cefax or Teletext — television-based information systems that operate by pulling signals from the airwaves.

We haven't heard of a telecommunications company called 'On Line'. It's possible you would have heard the term being bandied about because the business of transmitting data over the phone lines is known as being 'on line'.

So much for clearing up the confusion — now for the good news. You can get a modem to hook up to your BBC micro for as little as £50 from companies such as Maplin, Prism Micro-products or Tandata. These allow you to use telephone lines to talk to other micros, phone large databases such as Prestel and Micronet and (if you've got the right type of modem) link up to big American machines.

You won't, of course, be able to extract data from other people's micros unless they want you to — but you can use your modem to exchange programs with your friends over the phone lines and through electronic 'bulletin boards' where computer enthusiasts store public messages and programs.

Here are some useful addresses; Tandata Holdings plc, Wells Road, Malvern, Worcs WR14 4PA; Prism Micro-products, 30/31 Islington Green, London N1 8BJ; Maplin Electronic Supplies, PO Box 3, Rayleigh, Essex SS6 8LR.

No easy cure for Wordstar 60

Q A year ago I bought a Hayward 9000 Composite with a Diablo printer and I now understand the company has gone out of business. I also own a BBC B with a Torch Z80 disk pack which includes Perfect Software.

I am very unhappy with the Perfect software but very happy with Wordstar and Calstar. I am unable to transfer and use these two types of software on both machines: please tell me how to make the most of my large financial investment.

Since Wordstar is far superior to Perfect Writer I would prefer to use Wordstar on the Torch Z80 should my Hayward 9000 break down and I cannot get it repaired.

Morrison Buckley, Palmers Green, London.

A Woe, woe and thrice woe! Wordstar is notorious for the way it bypasses CP/M. It contains a large amount of installation code that is configured for the target machine. You could use a package like BSTAM to transfer Wordstar from the Hayward to the Torch but, because of the amount of

machine specific code, it is highly unlikely to run.

Three alternatives are open to you. The simplest is to buy versions of Wordstar and Calstar to run on the Torch. Or, if you are an expert in machine code programming you could try to re-write the installation code yourself.

The most cost effective solution would appear to be to use the RS423 program on the Torch systems disk to transfer your text files from the Hayward to the Torch disk pack. Should your Hayward subsequently break down you will at least have back-up copies of these files which can, in extremis, be edited and printed out using Perfect Writer.

If you want further advice about this problem we suggest you contact the Torch customer support department on 0223 841000 who may be able to help you.

Commodore 64 D-I-Y graphics

Q I've just got the hang of user defined graphics on my Commodore 64 and have written a program which creates these new characters. I can create one character but when I try to make more than one, the previous character disappears. Can you help?

Jason Robertson, Stoke on Trent.

A Without seeing the program you are trying to use it's difficult to say what might be happening. However, if you have successfully displayed your first user defined character you must be nearly there.

Because there are a large number of places where you can store your new character set, let's look at the procedure in general terms. Call the start of the new set NC. The built-in characters are held in ROM starting at 53248. Assuming you want to copy some of the alphabet into your new set, use the following lines;

```
100 FOR J = 0 TO 511
110 PEEK NC + J, PEEK (53248 + J)
120 NEXT J
```

This will copy the first 64 characters (8 bytes per character = 512 bytes). Remember that before you can do this you need to remove the I/O ROM block that lies above the character

ter ROM and switch off the keyboard interrupts. These lines will do that:

90 POKE 56334, PEEK (56334) AND 254

95 POKE 1, PEEK (1) AND 251
You also have to tell the operating system that the character set is in a new location:
130 POKE 53272, 28

This puts the characters at 7168 so set NC to that value. The remaining part of the set-up is to lower the top of Basic to protect the new set:

10 POKE 52, 48; POKE 56, 48; CLR
Now put the i/o block back and switch on the interrupts:

135 POKE 1, PEEK (1) OR 4
140 POKE 56334, PEEK (56334) OR 1

Now you can actually create your new characters using DATA statements. Suppose you wanted to replace the @ character. This is character 0 so these lines will turn it into a solid square.

150 FOR I = NC TO NC + 7
160 READ A: POKE 1, A
170 NEXT
500 DATA 255, 255, 255, 255, 255, 255, 255, 255, 255

Any character CH can be changed with the following formula:

CHAR = NC + CH * 7
FOR I = CHAR TO CHAR + 7

READ data; POKE 1, data
Remember that the character set is held in a 2K block so that by copying only 64 characters, there is space for 192 user defined graphics.

Oric hang-ups in high-Res

Q I read that on my Oric 1 I can save a high-resolution picture using

CSAVE "FILENAME",
#A3000, #E4FFF, if the picture lies between these two locations.

I've done this, but when I load it back, I get the usual loading message, and when I call #3000, the machine just hangs up. What am I doing wrong?

Also, I read recently that it'll cost me £50 to upgrade my Oric. Does this mean the new ROM costs that much — it seems an awful lot.

Michael Ellil,
Gzira, Malta.

A You've certainly got problems... There's no way you can 'execute' a picture using CALL. This command tells the CPU to start acting on machine code instructions,

starting at the address following CALL. Imagine the situation in Basic, there's no way you can run a picture — you have to run a program.

The Hires screen on the 48K Oric lies between 40960 (#A000) and 49119 (#BFE0), so where did you get #3000 and #4FFF?

Even if you have a 16K version and are using the 'official' memory addresses ie subtracting 32768 (#8000) from the 48K addresses, the 16K, high-resolution screen starts at 8192 (#2000), and runs to 16351 (#3EFC). However, as the Hires picture is repeated from the 48K address of 40960, it's easier to use — you don't have to do the messy subtractions.

You can save a picture with the CSAVE command. However, you must remember that all you're saving is a block of memory, which in this case is not a machine code routine, but simply information.

To save a Hires screen, go into HIRES, draw your picture, then issue a

CSAVE "Filename", #A#A000,
#E#BFE0. To load it, go into HIRES and issue a

CLOAD "Filename", #A#A000,
#E#BFE0, and the picture should appear as it's loaded.

You can make use of this 'block save' facility to save strips of the screen at a time eg the upper or lower half. This would allow you to load in a fresh band to overlay an earlier one during a program — a sort of pictorial 'consequences'.

When you save or load in HIRES mode, you'll come across a little known Oric bug. The Oric will load the message 'Saving' or 'Loading' at address 48000, which is fine in TEXT, as that's the start address of the top (status) line, but gives a nasty black line about two-thirds of the way down any picture you've got on the Hires screen.

If you get stuck in, you'll discover another odd feature. There are a few unused bytes of RAM between the end of the Hires memory (49119) and the start of the text memory for the bottom three lines you can PRINT on in HIRES mode.

As for the ROM upgrade (which cures the HIRSES line bug) Oric Products International still hasn't sorted out its plans. No prices have been set for certain, and the whole question of upgrades for existing Oric 1 owners is now under question.

pro clone.

1984 is already beginning to see Pro Clone Ltd as the most sought-after duplication house in the United Kingdom.

WHY?

- All our customers receive personal service.
- All material is dealt with in the strictest confidence.
- Our insistence on the use of quality raw materials and stringent quality control.
- Extremely fast turn-round, normally within seven days.
- Very competitive prices.

We can also supply very high quality blank media — any quantity.

If you would like to discuss your requirements further, do not hesitate to contact:

Justin Banville
Pro Clone Ltd.
Whitehill House
6 Union Street
Luton, Beds. LU1 3AN
Tel: Luton (0582) 459376

data duplication **fast.**

COMPUTERS
of
Wigmore Street

87 WIGMORE ST
LONDON W1
01-486-0373

NOW IN STOCK
INTERFACE 1 AND
MICRODRIVES FOR ZX
SPECTRUM ALSO 48K
SPECTRUM AND
FULLER KEYBOARDS.



More hints and tips to make programming a little easier.

If you've got something to write about... a bit of magic that'll make the world a better place for micro users, then send it to PCN Microwaves—our regular readers' hints and tips page. We'll pay you £5 if we print it. We'll pay you even more if your little gem gets our vote as microwave of the month. Think on... and write to Microwaves, PCN, 62 Oxford Street, London W1A 2HG.

Cut out and keep BBC B redefinitions

Much has been made of the imperfections of the Perfect Software provided with the Torch Z80 Diskpack for the BBCmodel B. One particularly annoying feature, for me, has been the problem with the delete key. Usually, it deletes backwards, but when entering text in Perfect Writer, it deletes forwards. Torch recommends that <ctrl>H be used to delete backwards, but this two-handed solution is far from ideal.

My own solution was to redefine the COPY key as delete backwards, giving both delete forwards and backwards. The BBC's cursor keys can be defined to do what they might be expected to do; move the cursor, forwards, backwards, up and down, replacing the <ctrl>F, <ctrl>B, <ctrl>P and <ctrl>N.

- *FX3,6
- *FX4,2
- *KEY 0 ICF
- *KEY 1 ICB
- *KEY 4 ICB
- *KEY 5 ICN
- *KEY 2 ICA
- *KEY 3 ICE
- *KEY 6 IC<
- *KEY 7 IC>
- *KEY 8 ICD
- *KEY 9 ICIBCD
- *KEY 11 IBD
- *KEY 12 IB
- *KEY 13 IF
- *KEY 14 IN
- *KEY 15 IP
- *FX3

SPECIAL KEYS SET-UP

I also placed a selection of my most used functions in f0-f9, leaving the break key intact.

The redefinitions were placed in a file called SETUP.SUB which I call simply by typing SETUP before starting.

G F Sargent,
Loughborough, Leics.

A quick Newbrain toggle

The following sequence:
100 GET#5,a
110.....

200 PUT#1,a:GOTO 100 is frequently used for editing text screens. Where #5 is the keyboard and #1 the text screen, the intervening lines 110-199 are used to trap special codes in order to keep count of lines, for instance, or trap special routines. In this mode, it is not possible to use Control/1 and Control/0 for caps lock and release. Instead use

```
120 IF A=21 LET C=NOT C:PUT#5,-C:GOTO 100
```

Typing Control/U (for upper case) will toggle the caps lock for the keyboard stream. Any other redundant control code can be used — alter 21 appropriately. You could use Control/C if it's not already in use.

Alex Temple,
Withington, Manchester.

MTX memory is unblocked

One of the biggest drawbacks to the MTX range of micros is the poor cassette handling routines, which allow only loading and saving of Basic programs and their variables. It is impossible to save, from Basic, blocks of memory; however, it can be done via this very short machine code routine thus:

```
LD HL, start of block
LD DE, length of block
LD A,data
LD (&FD68),A
CALL &0AAE
RET
```

Hit those Commodore keys

Many Commodore 64 programs include a 'hit any key to continue' section ie a line that waits for the user to press any key before the program continues.

This is normally achieved using a 'GET' or 'WAIT' statement. The disadvantage

```
100 REM 'HIT ANY KEY' DEMO
100 GOSUB 100:REM SET UP THE M/C ROUTINE
40 PRINT'HIT ANY KEY TO CONTINUE'
50 SYS 848:REM WAIT
60 PRINT'* OK *':GOTO 40
100 REM MACHINE CODE ROUTINE
110 RESTORE
120 FOR T=848 TO 881
130 :READ A:POKE T,A
140 NEXT T
150 POKE 788,52:REM DISABLE RUN/STOP
160 DATA 234,76,85,3,96,165,197,201,64,
208,249,173,141,2,208,244,165,145
170 DATA201,127,208,8,169,0,133,145,76,
84,3,234,76,85,3,0
180 RETURN
```

David Gristwood, Sunderland, Tyne & Wear.

data=0 for save and 1 for load.

This can be used to save arrays provided the array is totally contained in one page of memory and the start and end address are loaded from the appropriate system variables.

J Mullins,
New Briggate, Leeds.

of these that they won't detect the following keys: CTRL, SHIFT, CMB RUN/STOP (the latter may even stop the program).

The machine code routine here solves these problems. A simple call of SYS 848 waits until a key is depressed.

```
10 CLEAR 200,32500
20 FOR T=48053 TO 48076
30 POKE (T-(48053-32500)), PEEK(T):NEXT
40 FOR X=1 TO 100 STEP 10
50 EXEC 32500:A$=INKEY$IF A$="" THEN 50
60 PRINT"OK";T
70 POKE 32505,X
80 NEXT X
11 H Rees,  
Swansea, South Wales.
```

Dragon INKEY gets flashing cursor

While writing a CESIL interpreter for the Dragon 32, I needed a flashing cursor during an INKEY input. I set about disassembling the ROM and found a suitable routine at address 48053. However, this routine proved to be too slow so I copied it into the RAM and altered the flash rate. The routine can be copied as in lines 20 and 30 of the program below. The speed can then be altered by POKE 32505,N. Where N is a number between 0 and 255 (11 or 12 are suitable values for the cursor).

It is important to set the highest address for Basic before copying the routine. To use call EXEC 32500.

Dragon colour extensions

The Dragon 32 is quoted as having 8-colour graphics. In practice four colours are the most you can expect on one screen.

The routine below demonstrates a number of different colours that are not generally available, which can be used as backgrounds on the high-resolution screens. The routine produces at least six new colours by mixing those already available to form combinations and fills the screen with them.

Stephen McCoy,
Wantage, Oxon.

SETUP keys are as below for Perfect Software. ARROWED KEYS move one character, DELETE deletes forward and COPY deletes backward

MOVE ONE WORD FORWARD	MOVE ONE WORD BACKWARD	MOVE ONE SENTENCE BACKWARD	MOVE ONE SENTENCE FORWARD	MOVE ONE PARAGRAPH BACKWARD	MOVE ONE PARAGRAPH FORWARD	MOVE TO BEGINNING OF TEXT	MOVE TO END OF TEXT	DELETE WORD FORWARD	DELETE WORD BACKWARD
-----------------------	------------------------	----------------------------	---------------------------	-----------------------------	----------------------------	---------------------------	---------------------	---------------------	----------------------



WANTED! FULL-TIME AND FREELANCE PROGRAMMERS — WITH IDEAS!

Artic Computing, the makers of Gobbleman, Galaxians, Ship of Doom, Combat Zone, Voice Chess and many other best-selling home computer games are looking for programmers with bright ideas!

Have you got the game of the decade locked away inside your head?

Could you invent another Pac-Man? Or the 1980's answer to Space Invaders?

If you can devise new games and write them into workable programs for a wide range of

home computers then you could be the person we're looking for. Excellent opportunities available for full-time staff to work from our well-equipped head-office ideally situated between the delightful seaside town of Bridlington and the City of Hull.

££££££'s for Programmers!

Freelance programmers — capitalize on your skills now! Artic will purchase new programs as well as guarantee high royalties on all subsequent sales. If the game you devise is even moderately successful this could mean

considerable earnings for you.

Unlimited technical support!

If we think your ideas have potential we will provide you with full technical support — all the hardware you need, assistance with program development and advice on how to create even more popular programs.

All applications will be treated in the strictest confidence, and should be addressed to the Managing Director, Artic Computing Limited, Main Street, Brandesburton, Driffield, YO25 8RL.

PCN's Clubnet scout found Grimsby Computer Club getting down to business.

If your association has something special on the agenda or if you've just started a new one, contact us at *Clubnet, Personal Computer News*, VNU, 62 Oxford Street, London W1A 2HG.

Our complete listing of clubs and user groups will continue to appear occasionally. In the meantime Clubnet will bring you news of new clubs and events.

Getting a grip

Running computer courses for local business people and helping local scouts with their Duke of Edinburgh awards are just two projects Grimsby Computer Club has recently undertaken.

The courses, free of charge, were held at a local library. Individual business needs were discussed and club organiser Ian Fell gave demonstrations of a micro's advantages over manual methods, using a TRS 80 Model 1 with twin disk drives running CP/M, a Torch and a Sirius.

Those attending tried out everything from spreadsheets to accounting programs to discover if a micro would benefit their business, meeting weekly over a six week period. More such courses are planned for the future.

The club's Tandy group, which Mr Fell co-ordinates, is busy making a metal robot arm

against a young member presented designs by two of his school teachers. The club is looking into methods of making it and seeing which micros it will run off — its final use hasn't yet been decided.

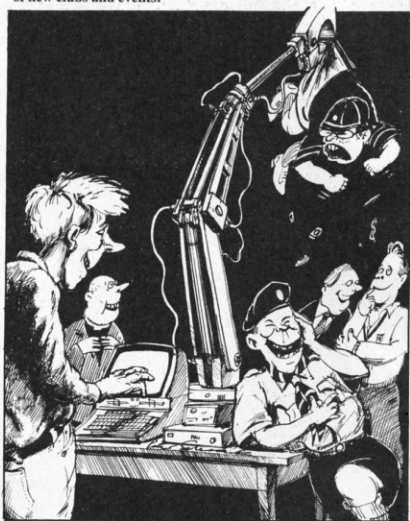
As for the scouts, Mr Fell said: 'A local group decided to do computing for their Duke of Edinburgh award — they've got all the awards they were going for.'

The club's 200 members attend computer fairs around the country and hold their own. Their last drew 4,000 people. Over 16 popular micros are catered for including the BBC, TRS 80, Cortex, Apple and Atari.

Name: Grimsby Computer Club
Venue: St James School Assembly Hall, College Street, Grimsby

Meetings: Alternative Mondays at 7.30pm

Contact: Ian Fell on 0472 49248



The HP150 — a touch of magic
with its unique touch screen the HP150 is
the ideal electronic office

SANYO

Columbia

**FOR THE FULL COLUMBIA RANGE AND THE
SANYO 550 AND 555**

Prices from:

SANYO — £899

Including:

WORDSTAR. MAILMERGE
SPELLSTAR. CALCSTAR. INFOSTAR
SAGE INTEGRATED ACCOUNTS

COLUMBIA — £2,650

Including:

SOFTWARE SUPER PACK

Please contact

SANDRA WOODLEY
Berkshire Micro Centre
1 Shute End
Wokingham Berkshire
Tel: 0734 & 782288

PRICE BREAKTHROUGH

PRINTERS:

EPSON RX80	£249.00
EPSON RX80 F/T	£279.00
EPSON FX80	£379.00
JUKI 6100	£375.00
STARDELTA 10	£365.00
KDC FT5001	£259.00

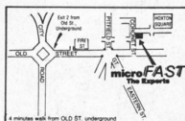
MONITORS:

SANYO MONO DM2112	£75.00
SANYO MONO DM8112CX	£99.00
MICROVITEC COLOUR 1431	£219.00
MICROVITEC COLOUR 1451	£339.00

PLUS FULL RANGE OF SEIKOSHA
PRINTERS, TORCH DISK PACKS
ALL AT INCREDIBLY LOW PRICES.
ALL PRICES INCLUSIVE OF V.A.T.

microFAST
The Experts

01-729 1778



57 Hoxton Square, London N.1
PHONE FOR PRICES & FULL RANGE

GROWN OUT OF EASTER EGGS?

VISIT THE PERSONAL COMPUTER GAMES EASTER SHOW INSTEAD



GOOD FRIDAY

APRIL 20TH - 10-6

EASTER SATURDAY

APRIL 21ST 10-6

EASTER SUNDAY

APRIL 22ND 10-6

FEATURING the Music Marathon
broadcast live on Radio One! Your
guest stars include: Kim Wilde, Queen, Phil Collins,
Bucks Fizz, Wham!, Nick Heyward, UB40
& many more.

SOLIHULL
CONFERENCE CENTRE
HOMER RD, SOLIHULL
WEST MIDLANDS

Personal Computer

GAMES

EASTER SHOW '84

Don't be late! For Advance Tickets and Group Tickets cut out the coupon opposite.

To: P C Games Tickets c/o Savita Ayling
VNU
62 Oxford Street, London W1A 2HG
Tel: 01-636 6890

Please send me the following:

Advance Tickets at
£1.50 each

Group Tickets at
£1.20 each (10 or more)

I enclose a cheque, made payable to
VNU Business
Publications for £

Charge my Access/
Barclaycard No.

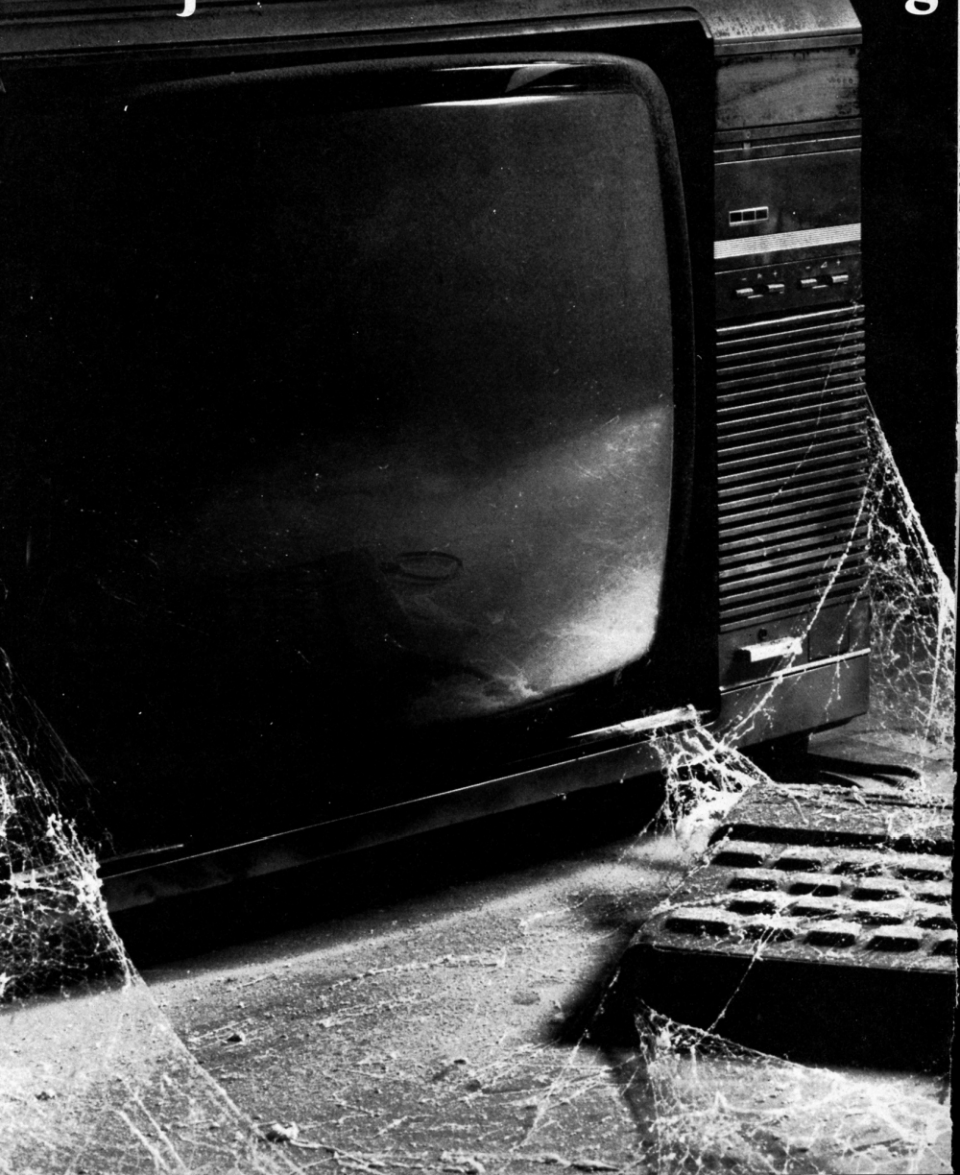
Signed

Name

Address

ENTRY
£1.50

We've just won an award for blowing



away the cobwebs.

You know the story, the Micro you thought would give endless hours of fun soon becomes a five minute wonder. You get bored and dump it on the shelf to gather dust.

With the introduction of Micronet 800 you now have access to a vast mouth-watering menu of facts, figures and fun.

If we said it was a major breakthrough in microcomputer technology we wouldn't be going over the top.



Just recently at the Which Computer Show we picked up the prestigious RITA award for Systems Innovation of the Year.

RITA is the 'Oscar' of the computer industry. Judged and sponsored by the major forces in related institutes, associations and publications.

Incredibly all it costs is just a pound a week to take up a subscription to the Micronet system. Plus, for most of you, a local telephone call whenever you want to connect up.

Then you've got 30,000 pages at your fingertips, including Computer News Flashes, all that Prestel has to offer, and Micronet's SwapShop. Where you can buy anything from joysticks to second-hand computers.

Interact with our daily news update. You can even take over the world; competing against hundreds of other subscribers on the system, in our 'Starnet' game.

If we haven't won you over with that then try downloading our wide selection of free games and other tele-software.

Naturally, you can run household accounts, manage businesses, talk to other subscribers nationwide using the system.

The list is endless and so is the fun.

The only addition you need to connect with Micronet 800 is a modem unit.

Apart from that all you'll want is a pen to fill in the coupon for more information. Then we'll have you linked up in no time.

Before the dust settles, in fact.

Please send me the full facts about Micronet 800.

Name _____

Make/Model of Micro _____

Address _____

Telephone _____

MICRONET 800, Scripser Court, 155 Farringdon Road, London EC1R 3AD.
Telephone 01-278 3143.

PCW/484

micronet
800

PCN PRO-TEST HARDWARE

It's not polite to point — at least that's what many of us have been brought up to believe. But longtime scientific and professional computer manufacturer Hewlett-Packard has now embarked on a campaign to make pointing and even 'touching' not only respectable, but desirable. Its new micro — the HP-150 — has been launched in this country with a built-in 'touch-screen' system that allows you to issue instructions by pointing at the screen.

The touch system is the first major alternative input device for a personal computer since the mouse — so its introduction on the HP-150 is an important event in its own right. And the fact that this revolutionary new system is being introduced on H-P's first major entrant into the PC market is even more significant.

Construction

The HP-150 is not just a new business micro with a special gimmick. It's also an incredibly well-built and high-powered MSDOS machine that would turn a few heads even without the touch-screen system. It comes with two of the new Sony 3 1/2 inch drives, 256K standrd RAM, a high-resolution green-screen monitor, two RS232 ports, one IEEE port and uses a built-in battery-backed clock which constantly displays the time on-screen.

The keyboard is a good deal superior to that of the IBM-PC (the machine that H-P's managing director has said he sees the HP-150 competing against) and offers a set of eight function keys across the top to offer an alternative to selecting options by touch-screen. The cursor key arrangement is also quite extensive with dedicated function keys for moving to next and previous screens, moving to the top of a file and moving up, down, left and right.

The disk drives are quiet, effective and reliable — particularly when used with H-P's built-in Personal Applications Manager 'front-end' program and (3 1/2 inch isn't the only disk system supported; you could run either 5 1/4 or 8 inch floppies or take your pick of Winchester systems). The front-end program boots up automatically from the master system disk and immediately scans both disks for programs and then lists those programs in touchable boxes on-screen. You only need touch the box with the name of the program you want and it will light up in preparation for use. Then just press the 'Start Application' key and PAM will go and get the program and run it.

The disadvantage of this system, however, is that PAM does seem to slow down the disk system. It can take more than ten seconds to load a program from disk — and sometimes a good deal more than that — but it seems that the reason for this slowness has more to do with the background operating system than a lack of speed in the hardware.

This observation was confirmed when running the machine under Microsoft Basic while writing to and ready from the disk. It was appreciably (at least twice) as fast as the disks running under the Personal



H-P in touch

Geof Wheelwright points out the pros and cons of H-P's 150.

Applications Manager. Probably a little further work on 'tweaking' this interface would speed up the disk system considerably.

With this reservation aired, however, there's a good deal about PAM that other front-end designers could do well to emulate. There is, for example, PAM's disk formatting procedure which allows you to format several disks at once in one of two formats; IBM 3740 or H-P format. The disk system also prompts for a name with every new disk that you format, so that the disk is 'labelled' both internally and externally.

PAM also takes care of running the 'File Manager' which does all the regular MSDOS-type tasks such as displaying directories, reading through files (which H-P calls 'browsing'), copying files and

backing up disks.

The shell also takes care of displaying certain bits of background information such as the current time and date, how much room is left on the disk and the currently-held functions of the touchable 'softkeys' at the bottom of the screen.

But if you're not feeling up to learning a new operating system (and you'd have to be pretty lazy not to bother with one as friendly as this) then you can always go into standard MSDOS and run the HP-150 from there (although you'll have to forego using the touch-screen if you do).

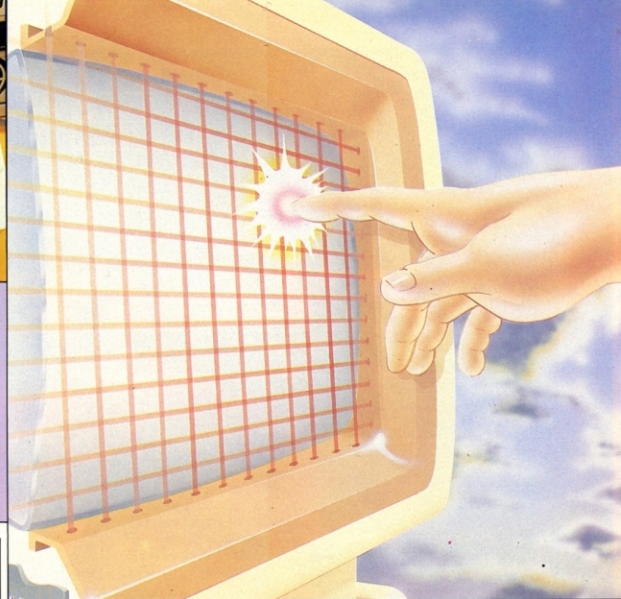
The software currently provided for use with PAM and the touch-screen system is high quality stuff — with the old 8-bit Visicalc program being adapted for use with touch, and two new programs being specifically adapted for use on the HP-150.



The HP-150's touch-screen works by interrupting a series of infra-red beams that form a grid running across x and y co-ordinates in front of the screen.

At right, the diagram shows how the beams are generated in the casing surrounding the screen. That casing houses a printed circuit board (see picture above) which interprets the information sent from the beam-interrupts (seen along the edge of the screen casing).

The only problem with this grid is that, by its very nature, it cannot allow direct accessing of each point on the screen. Because the 'device' you're most likely to use in pointing is a finger — which is about the width of at least two characters or screen points — HP could only make the beam grid fine enough for the average finger.



Memomaker is an easy-to-use bare bones word-processor provided by H-P as a down-market alternative to Micropro's Wordstar (also offered on the 150) and Graphics is a similarly simple business graphics system.

Memomaker is made that much easier to use with the facilities provided by being able to touch the screen. Although the touchable grid is only 14 rows by 21 columns, you can often use your finger to get on or near the piece of text you want to modify within a document, although if it's not on-screen you'll have to scroll the screen down until it is.

So cursor movement quickly becomes not a matter of trying to remember a Wordstar-style series of control keys, but rather a pointing to a general area and using the cursor keys for exact positioning. And block moves are also simple — just put your finger at the beginning of a block and then at the end, and Memomaker will mark the text in between in inverse colour and ask if the block is OK. If the block is indeed 'OK', just press the on-screen box saying so and it will be moved.

Documentation

The HP-150 uses IBM-style, thick ring-binders to hold its documentation. The

binders are easy to use and have stick-out tabs and a quick-reference card which lets you find what you need to know quickly and easily. The documentation makes copious use of screen shots and highlighted text to clarify important concepts.

They are so similar to the IBM manuals in style and content that it might seem that H-P has tried to redefine the extent to which machines are IBM-compatible. Although the HP-150 runs MSDOS — and not IBM's own proprietary operating system (PCDOS) — the systems are similar enough that software suppliers shouldn't have too much problem modifying their IBM programs to run on the HP-150.

The ring-binder approach is not only IBM-like, but also makes for easy software updating as old pages can be removed and new ones slipped in.

Printer

The HP-150 has the added capability to run a built-in thermal printer in the top of the machine which can easily be configured to

print formatted text as well as do screen dumps. The text resolution on print-outs is very good, with a highly readable typeface gracing the thermal paper — although some graphic outputs suffer from a little 'streaking' and the occasional thin white line where the printer has missed a 'pass' across the paper.

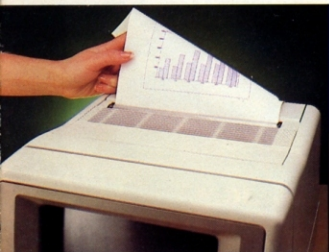
The printer is also very quick and quiet — it will print a whole graphics screen in about 40 seconds — which is quite remarkable given the quality of the finished product (see Figs 1, 2 and 3). The printer can also use the underlining and boldface options built into the Memomaker program — and although thermal paper coming off a roller isn't what you would normally send your correspondence out on, it does photocopy very well if you want to transfer the text to letterhead paper.

The printer can also be set to stop at the end of every A4 page, so you can separate pages evenly without having to try and figure out where page breaks should be.

At the very least, this printer is an excellent device for getting hardcopy 'backups' and previews of your work — and because it's an integral part of the HP-150's design it takes up little extra room by just sliding into the top of the monitor (see photo).

Interfaces

The HP-150 is well-equipped with holes for plugging in whatever you're likely to use with it. It has two RS232 serial communications ports, one IEEE port (the HPIB or Hewlett-Packard Interface Bus) and two memory expansion slots that allow for growth to 640K. The HPIB might look to be fully occupied as it's what H-P uses to



The HP-150's optional thermal printer slides easily into the top of the machine and operates very quietly. It prints either graphic from the screen or text from memory. Above you can see the kind of high-resolution graphics available on the printer. Its only drawback seems to be that small white lines sometimes streak across the paper in graphics mode.



FUJITSU



FUJITSU



Personal Computers from Fujitsu. Japan's Leading Computer Manufacturer.

Think of microtechnology and you think of Japan. The undisputed leaders and innovators. The home of virtually every world-famous name in the field.

At the heart of all microtechnology is the computer. And Japan's leading computer manufacturer is Fujitsu. We make everything from one-chip micros to large-scale systems.

Now, Fujitsu are launching their personal computers in Britain. And because we manufacture all our components ourselves, we can offer superb personal and business systems at competitive prices.

We are making a long term commitment in Britain. And we're looking for dealers. Dealers who are experienced and well supported. Dealers who wish to make a long term commitment for a solid future.

We're going right to the top. Make sure you're there with us.



FUJITSU MIKROELEKTRONIK 1 Curfew Yard, Thames Street, Windsor, Berkshire SL4 1SN. Telephone number 07535 50551.

PCN PRO-TEST HARDWARE

run the two disk drives that come with the machine — however, the interface plugs that connect disk drives to the HP-150 are male-female, so that other peripherals can be daisy-chained off the back of them.

The serial and internal expansion interfaces are both easy to use and configure. The HP-150 comes with a built-in terminal configuration program which is easily used to set baud rates and other specifications of each serial port, as well as the default values for printers and disk drives.

This means that you can use the HP-150 with most electronic mail systems without having to purchase a communications package (although if you want to do much more than just limited on-line input and mail reading, you'll need to get H-P's DSN-LINK communications package).

Verdict

The HP-150 is a very nice machine. It's well-built and reliable, uses state-of-the-art technology and offers every opportunity for expansion that you're likely to want.

Any slowness imparted to the system by PAM can probably be dealt with by H-P with a few revisions to the BIOS, although if that takes away from PAM's usefulness as a front-end system I wouldn't bother.

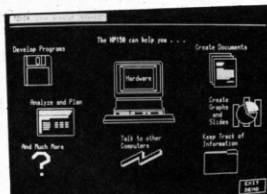
The HP-150 is, however, expensive. The basic dual disk drive system clocks in at just under £3,000 (although there is a no-disk option for using the HP-150 as a terminal that costs £600 less) — making it a competitor to the IBMPC rather than Apple's new Macintosh (for a comparison of the Mac and the HP-150 input systems see the following page).

But as a competitor to the IBM PC, it beats the Big Blue hands down. Even though it's more expensive on the face of it, you would do well to remember that the H-P's price includes many more built-in interfaces than the IBM, more memory, has the touch-screen system and one of the best monochrome monitors I've ever seen.

If you want an MSDOS machine and are willing to spend close to £3,000 on it, I would venture to say that the HP-150 is the best you're likely to find.

SPECIFICATION	
Price	£2,900
Processor	Intel 8088 at 8 Mhz
RAM	160K
RAM	256K expandable to 640K
Screen	9-inch green screen, 80 x 24
Keyboard	ASCII code keyboard, 8 function keys, numeric keypad
Interfaces	HP-IB, RS-232, RS-232 and RS-422 combined, 2 Sony disk drives, optional 2674A built-in printer
Operating System	MSDOS
Software	PAM (Personal Applications Manager) and MSDOS utilities
Distributor	H-P (UK) (0344) 773100

Keyboard alternatives: touch screen or mouse



H-P's touch screen — what it loses in accuracy it gains in ease of use.



Apple's mouse — an all-round tool for screen manipulation.

The technology behind the "H-P Touch" has nothing to do with either screens or touching. You don't need to physically touch the H-P's screen to use the "touch" interface — nor does your finger actually have to come in contact with any solid object. All you have to do is interrupt a grid of infra-red beams.

The beams work in much the same way as those automatic door-openers in many large supermarkets and airports — an infra-red beam is sent from one side to the other. When you interrupt the beam a switch is activated.

In the HP-150 instead of one beam you have a series of them, each reporting an x and y co-ordinate on the grid. But because the HP-150 cannot accept more than one x-y co-ordinate at once, the intercept points have to be kept no smaller than the size of an average finger.

This means that you can't, for example, move the cursor character-by-character in an 80-column word processor — although you can get to within a few characters of where you want to be. And once you're there, you can use the keys to "fine-tune" the cursor position.

Contrast this approach with the mouse input device, popularised by Apple on its Lisa computer and (more recently) its new Macintosh. Both the mouse and touch systems are considered as alternatives to the much-slandered QWERTY keyboard.

Accuracy

The mouse wins hands-down on accuracy — you can move the mouse pointer around the screen character-by-character. Although the designers of the touch system might argue that they were limited by the fatness of the human finger, people who want to move the cursor straight to a given word will not find much solace in this reasoning.

Ease of use

The touch screen wins here. Although the mouse may be more accurate, it is sometimes difficult to find a surface that the mouse can easily roll across and it's

often easy to get disoriented between screen and mouse. The touch screen doesn't present any such problems — just point to the area on the screen with which you wish to work and you're (almost) there.

I found that on average it was faster to point to a piece of text with the touch-screen and then fine-tune with cursor keys than to move one hand to the side of the keyboard, move the cursor with the mouse and go back to the keyboard again. On the Macintosh, this problem was compounded by the lack of cursor keys — you have to use icons at the side of the screen to move text up and down.

The other important point about the touch system is the fact that the whole machine is not tied up to it. You can get by without using touch at all. If you want to use function keys instead of the labelled touch boxes at the bottom of the HP-150's screen, or use MSDOS instead of PAM — you still have that choice. The whole machine is not dependant on the alternative input device.

Conclusion

So the biggest strengths of the touch system are that it is more immediately easy to use and that it is a true alternative input device in the sense that you don't have to use it. You don't have to try to claw back some empty space on your desk in order to run a mouse around.

However, on the fronts of accuracy and diversity of use the mouse is likely to continue to win. There are already several types of mice available — not all of which suffer the same problems as Apple's mechanical roller-ball model — and the mouse "environment" is becoming an increasingly popular feature on new machines.

Probably the most important difference between the systems is that a mouse makes the Mac, while the touch screen is only one of the interesting features of the HP-150 — one that it could quite effectively operate without.

M.D.R.

SAVE ££s — CONSULT US!

Whether you're thinking of buying a micro, peripherals, or software, for business or pleasure — consult us and we will advise you as to making the Right Choice.

ALL FOR £7.25 MEMBERSHIP FEE

- If you know what you want, we can supply all hardware, software and peripherals at a **GREAT DISCOUNT (10-20%)**

Examples:

SANYO MBC 555
COMMODORE 64

£810 + VAT
£143.65 + VAT

- If we can't help you, we will give you a

FULL REFUND

Write to us at:

MDR

27 Belleville Road, London SW11 6QS

— stating what your purpose or user-problem is, or what particular piece of Hardware/Software you're interested in. Please enclose a cheque or postal order made out to MDR for £7.25.

THERE ARE NO HIDDEN CHARGES REGARDLESS OF THE AMOUNT OF TIMES YOU USE OUR CONSULTATION OR PURCHASE SERVICE

We will reply to your letter by phone or in writing within 10 days, or you will receive a Full Refund.

MDR

Credit Facilities Available

MDR's MOST EFFICIENT MAINTENANCE/EMERGENCY SERVICE

ALL YOU PAY IS 14% of Hardware cost per year

What you get

24 hr EMERGENCY SERVICE

48 hr REPLACEMENT MACHINE SERVICE

**OFFER OPEN TO BUSINESS
AND HOME USERS**

And if you do not use the service you get half annual premium returned

Write to MDR for more information stating machines/peripherals for cover

I enclose CHEQUE/POSTAL ORDER FOR £10.00

NAME _____

ADDRESS _____

Tel: _____

WHICH SERVICE YOU REQUIRE

PURCHASING

CONSULTANCY

MAINTENANCE

ALSO ENCLOSE A BRIEF
EXPLANATION ON THE SERVICE
YOU REQUIRE

SEND TO: MDR, 27 BELLEVILLE ROAD, LONDON SW11 6QS

No need to be a programming know-all to use your Spectrum to the full, says Steve Kramer.

Another routine day?

If you want to be able to use your Spectrum to the full, it helps to have some understanding of assembly language programming of the Z80 chip. But if you're not familiar with the internal details of your Spectrum's operating system you can still profit from using short cuts in the shape of routines that are already in ROM.

By using calls to the Spectrum 16K ROM, or even the 8K ROM in Interface 1, you can often produce results beyond your wildest dreams, sometimes simply by using a CALL. In this article I shall be looking at the system variables and how to use them to advantage, and will also go into a certain amount of detail regarding the hardware, where the possibilities are considerable.

You could, for example, construct sideways ROMs as used by the BBC, or by using the extra RAM in the lower 16K you could gain access to CP/M operating systems. These, however, are ideas you will have to enlarge on yourself, as the circuit diagrams and construction details alone would fill a book.

I will be presenting a certain amount of information that will be of use to the uninitiated programmer who would like to get some benefit from machine code without learning how to write it, although you should be warned that I'll be trying to whet your appetite for more.

Unless you're happy converting the assembly language routines by hand into numbers and then poking them into memory, you should get yourself an assembler. I recommend the Picturesque Editor/Assembler and the Monitor/Disassembler. I also recommend HiSoft's Devpack 3.

Useful CALL addresses

Printing: RST 16(10H) — The character whose code is in the A register will be printed to whichever stream is currently open. This can also be used to print control codes, ie TAB, INK, OVER, etc. See the Spectrum manual for details.

Opening and closing streams for rst 16(10H): CALL 5633 (1601H) — this sets the output for RST 16(10H) to the stream held in the A register when called. Normally A=2 will print to the main screen, A=3 will print to the printer and A=1 will print to the lower screen. With Interface 1 connected, other streams can be used for output to the Microdrives, network or other devices.

It's also possible to divert streams for your own purposes, eg for controlling an interface such as the Kempston or other Centronics interfaces.

Detecting if break is being pressed: CALL 8020 (1F54H) — This CALL will return with the carry flag set if it is not being pressed and with the carry flag reset if it is being pressed. Note that this CALL tests for both



Caps Shift and Break being pressed. If you want to test for break alone you can use:

```
LD A,7FH
IN A,(FEH)
RRA
JP NC,PRESSED
```

Setting the position using rst 16(10H): CALL 3545 (DD9H) — This routine requires the B register to hold the screen line number in the form of B = 24-line number ie if B = 24 this is the top line of the screen and if B = 1 this would be the bottom line.

Unfortunately, due to an oversight in the writing of the ROM, you cannot use lines 23 and 24 for printing on the main screen. So you must use the lower section by setting up the output stream for RST 16(10H) to be 1, and using the top two lines of the lower screen.

C is 33 minus the column number eg if C=33 this is the left-most column and C=2 is the right-most. This CALL automatically updates the system variables for the print positions on whichever stream you are using, as set up by calling 5633 (1601H). Caution should be exercised on the last line of the main screen as a scroll message will be generated after printing on the last available position. This will cause a return to Basic if answered with n or Break.

In addition, any attempt to print to stream 1 will cause scrolling up of the lower screen when the available space set up by the system variable DF SZ (23659) has been filled. This can make for some unexpected results. Obviously, when printing to a printer you cannot set a line number, so the B register is not used.

Clearing the whole screen: CALL 3438 (D6EH)

```
LD HL, SPARE WORD
LD (HL), D
INC HL
LD (HL), E
```

The ROM routine at 6696 (1A28H) can now be called with HL pointing to the address SPARE WORD, which will then be output in ASCII to the current stream. But there are some drawbacks:

- It will only be output correctly if it is less than 10,000 decimal and it must be an integer.

- The number will be output with leading spaces so that chaining outputs to create a larger number will only work if each number output is between 1,000 and 9,999, otherwise spaces will be introduced.

Those of you who have the Spectrum Pocket Book, and have read about this CALL address but not used it, will be calling me an idiot, as the author points out that the E register controls the way the number is formatted. If you have used the routine you'll know that this is not quite the case, as the E register is ignored.

There are two ways round this problem. First you could write your own routine to by-pass the first part of the ROM routine, such as:

```
PUSH DE
LD D, (HL)
INC HL
LD E, (HL)
PUSH HL
EX DE, HL
LD E, 20H
JP 1A30H
```

Note that the last instruction must be a JUMP and the routine you have written must be CALLED, otherwise the stack will be mixed up. This is because the return address is stored on the stack and the routine POPS from the stack the PUSHes you have made. You'll see that the E register is loaded in your routine, and as this is a duplicate of the start of the routine on ROM you can see why the Pocket Book is wrong.

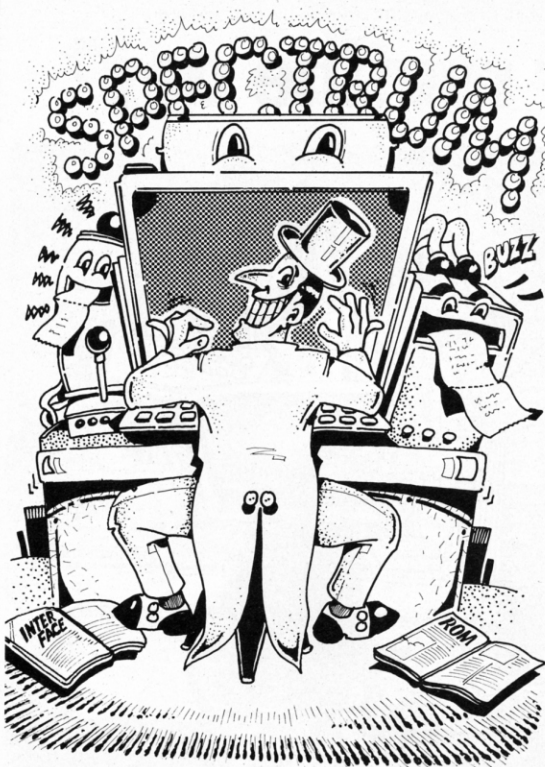
Now you can change the LD E, instruction to be either 48 decimal, in which case leading zeros are printed, or 255, when anything significant isn't printed at all. But wait a minute, you'll be saying, now I can see why the byte order has to be changed. If you reverse the order of loading the DE register pair or even load HL direct the number doesn't have to be reversed, so it is worthwhile rewriting this short piece of code to be incorporated in your own program as a subroutine for outputting numbers.

There is one other part to this routine in the ROM worth considering at this point, and that is the part starting at 1A1BH. This simply takes the number in the BC register pair and outputs it with no leading zeros or spaces.

With a little thought these routines now give you the possibility of outputting a number up to 9999.

PCN

The Spectrum's ROM houses a large number of routines just waiting to be tapped. Whenever space permits PCN will be carrying some of the ones that Steve Kramer has identified, so look out for them.



This clears the screen and resets the attributes to those in system variable ATTR P for the mainscreen and BOARDCR for the lower screen (23693 and 23624 respectively). See the Spectrum manual for how these are made up.

Clearing the lower screen: CALL 3438 (D6EH) This will clear the lower screen only and reset the attributes. Note that both the above routines reset DF SZ to 2 and can corrupt the current channel used by RST 16(10H), so this will need to be reset. The current print positions are set to the top left of the respective screens.

Scrolling the screen: CALL 3582 (DFEH) — This scrolls the screen up by one line but leaves the current print position unaffected, so if you continually print to the same line, scrolling the screen at the end of each line, you will have an effect like typing on a typewriter, printing from the bottom and the print being moved up after a carriage return.

Plotting to the screen: CALL 8933 (22E5H) — The point addressed by the B register (Y 0-175) and the C register (X 0-255) will be plotted to the screen. The INK and PAPER

colours can be set up previously by loading the system variables for the attributes with the colours you require, or the current attributes will be used.

OVER 1 can be set by SET 0, (1Y+87) or reset by RES 0, (1Y+87), and any point can be unplotted by SET 2, (1Y+87). Note that it is perfectly possible to plot to the lower screen, and this should be avoided, if not required, by setting the stream required with the 5633 (1601H) CALL.

Getting a number to a stream

This is the most complicated routine so far, and does not have a simple CALL address as such. There is a routine in the ROM for taking a 16-bit number from two addresses and outputting it in decimal form, but it has the disadvantage that the number must be stored 'about face' from the way that the Z80 stores them. This means that you must load the number into a register pair and then store it back into a space in memory the opposite way round *ie* high order byte first. A short program such as this will serve:

```
LD DE, (address where number stored)
```


The Laughing Shark wants

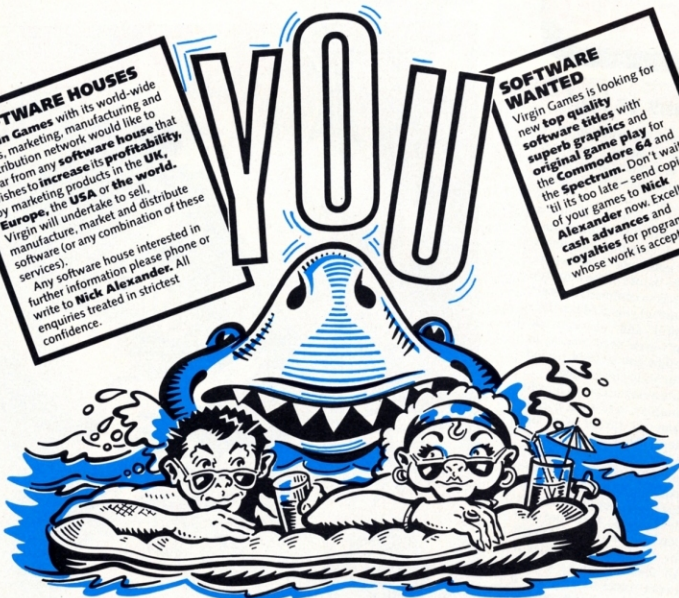
SOFTWARE HOUSES

Virgin Games with its world-wide sales, marketing, manufacturing and distribution network would like to hear from any software house that wishes to increase its profitability, by marketing products in the UK, Europe, the USA or the world. Virgin will undertake to sell, manufacture, market and distribute software (or any combination of these services).

Any software house interested in further information please phone or write to Nick Alexander. All enquiries treated in strictest confidence.

SOFTWARE WANTED

Virgin Games is looking for new top quality software titles with superb graphics and original game play for the Commodore 64 and the Spectrum. Don't wait 'til it's too late - send copies of your games to Nick Alexander now. Excellent cash advances and royalties for programmers whose work is accepted.



for Virgin Games

SOFTWARE MANAGER

Virgin Games, that well-known software house based at the centre of the universe (London), is looking for a young (not too young), trendy (not too trendy) technical (very technical) wizard to take full (well almost full) control of its programming and technical department. This senior position offers the right person the opportunity to join one of the world's fastest growing industries - computer games. The successful wizard will be responsible for building-up and consolidating a complete self-contained department.

Applicants must be fully conversant with most makes of home computer, especially the Spectrum, Commodore 64 and BBC. A top flight salary will be paid for the right person and job satisfaction is guaranteed (well, almost). If you think you're the one, write and tell Nick Alexander why he should give you the job.

PROGRAMMERS AND GAMES CONVERTERS

Wanna be part of the fastest growing industry in Britain today? Don't we all! This could be the chance you have all been waiting for. Virgin Games, one of the country's leading software houses is seeking young computer programmers to increase its in-house team of wizz kids. Successful applicants must be fully conversant with programming the Sinclair Spectrum, Commodore 64 and the BBC Micro. If you can work on other machines, so much the better (clever clogs). If you think you can write brand new games from designers' specifications together with converting software from one machine to another, then we want to hear from you. Write with full details of your programming skills and examples of your work to, Nick Alexander.



Virgin Games Ltd., 61-63 Portobello Road, London W11 3DD. Tel: 01-221 7535

Purchasing goods via mail order? Ian Scales takes the cons out of being a consumer.

**YOUR RIGHTS
MAIL ORDER**

Fair means or foul

Hardly a week goes by without PCN getting a letter or a phone call from someone who has lost their money after replying to an advertisement in one of the micro magazines. Less often, but still fairly frequently, we hear about a company that has gone bankrupt, or just plain disappeared, leaving customers with neither their goods nor their money.

If you look at the nature of the industry you'll see why this is so common. To start up a software house all you need is a little programming skill and an address. Initially you don't even need money, as magazines will allow you a credit period before you pay for your advertising.

At its worst, it's a classic case of how to get money for nothing, and even honest programmers can get tarred with the same brush if they fall down on deliveries.

But honesty can be a variable commodity in the micro industry. Is it honest to advertise a product before it's released? Or is it honest to take money for a product you're still developing, then use the money to develop it? And is it honest to sell a micro on the strength of qualities it hasn't got? All these things have happened, and in many cases the first you'll know about them is when they happen to you.

But if you're careful, and if you know your rights, you can lessen your chances of losing money. Follow the steps we give here and you'll probably end up a little richer.

The pitfalls of mail order are legion, but the catch for micro users is the fact that you often have no choice. Frequently you'll find you want something you can't buy in a shop, so you have to trust a mail order company with your money.

Or do you? Consider the following wording: 'This money is sent on condition that you will hold it as a trustee on my behalf, and that it will remain mine until the goods have been sent to me. If you accept this payment you will be deemed to have accepted this condition.'

Let's say that you put this wording on the back of the cheque you send off to pay for the goods — what exactly are you doing? Note that you're not asking the company you're sending the money to do anything — you're requiring it to do so. You are telling the company that, if it accepts your money, it remains your money. The company is therefore acting as a trustee for

you, and should hold such payments from consumers in a separate account.

The wording was devised by the National Federation of Consumer Groups (Newcastle (0632) 618259), which can supply printed stickers to this effect. Its aim is to allow potential buyers to reclaim their money if they aren't sent the goods and/or the company goes bust. Provided the mail order company complies with your wording, your money is held on trust and isn't the property of the company, so if the company becomes insolvent your money can't be used to pay off its debts to other people.

Fighting chance

So to protect yourself, make sure that the exact wording on PCN's cheque sticker is reproduced on the back of your cheque, and if possible on the back of your order form. If you're at all unsure, take a

photocopy (you'll be needing more than one) and paste it on the back. Now provided you've completed your order form correctly, filling in the correct name and address of the supplier, sending the right money and fulfilling any other conditions the supplier makes, then a trust should have been created.

Even if the supplier just pays the money into its ordinary bank account, the law deems that your money is held on trust, therefore you should have a fighting chance of getting it back if the worst happens.

Of course, you're still not out of the woods. If the supplier goes out of business you'll still have to prove that your money passed into the supplier's hands, and although there'll be no problem with this if it is held in a separate trust, if it's mixed in with the rest of the company's funds there'll be problems identifying it, espe-

Buyers beware



JUKI

The Art of Daisywheel Printing



The new Juki Model 6100 letter quality daisy wheel printer, has full features you'd expect to find on a more expensive printer.

It can support word processing and graphic functions, print 20 CPS and use a simple drop-in daisy wheel.

The 6100 has 10/12/15 pitch, proportional spacing, utilizes IBM standard Selectric ribbons, has 2K buffer memory, parallel interface both tractor feed and serial interface are available as options.

That's only the beginning - Best of all, the low-noise Juki 6100 is extremely reliable.

Your can pay more, but you can't buy better than the Juki 6100.

FEATURES:

*20 CPS (max.) print speed *Bold and shadow printing *Subscripts and superscripts
*Wordstar compatible *Diablo protocols *Auto Underlining *Standard 2K buffer *1 year parts and labour warranty *Comprehensive user friendly manual

 **Micro Peripherals Ltd**

THE POWER BEHIND THE PRINTED WORD

69 The Street, Basing, Basingstoke, Hampshire RG24 0BY
Telephone: 0256 3232 (12 lines) Telex: 859669 MICROP G

Call your local dealer NOW for full information on the Juki 6100 Daisywheel Printer or clip this coupon and we'll send you brochures and print samples.

Name.....

Address.....

.....Tel. No.....



cially if there isn't enough.

If there is actually a trust account, but the supplier has taken some money out of it, then the people who'll actually suffer are the ones whose money was paid in to it first, not last, as the law operates on the basis of 'first in first out.' You may also find that your money has been used to pay off a creditor but you can't trace which creditor. In this case selling the property you originally meant to buy may be the only solution. However, this entails taking out a court order.

So the method proposed here is by no means foolproof, but it will help, and if enough people use it pressure can be brought on mail order companies to set up trust accounts.

And there are other conditions you can place on your cheque being accepted. If, for example, you're worried about long delivery times, then make delivery within, say, 28 days a condition of the company's acceptance of payment.

But to avoid such problems let common-sense prevail. If you've dealt with a mail order firm successfully before, it's a reasonably safe bet you can do it again. And before you send off the money, phone the company to see if it's still in business, whether it has what you want at the price you want to pay, and whether it's compatible with your micro and add-ons.

If a firm doesn't display a telephone number, and you can't find it through directory inquiries, try looking elsewhere. Though perfectly reputable people do work without a phone, beware of an established firm which doesn't give its number; if nothing else it might be fair warning of the level of after-sale support it's prepared to offer.

PCN



Don't deal with a company that doesn't publish a phone number.



Make sure the company still exists before sending money.



Try to deal with a company you know you can trust.



Make sure you put a 'trust fund' sticker on the back of your cheque.

THIS MONEY IS SENT ON CONDITION THAT YOU WILL HOLD IT AS A TRUSTEE ON MY BEHALF, AND THAT IT WILL REMAIN MINE UNTIL THE GOODS HAVE BEEN SENT TO ME. IF YOU ACCEPT THIS PAYMENT YOU WILL BE DEEMED TO HAVE ACCEPTED THIS CONDITION.

THIS MONEY IS SENT ON CONDITION THAT YOU WILL HOLD IT AS A TRUSTEE ON MY BEHALF, AND THAT IT WILL REMAIN MINE UNTIL THE GOODS HAVE BEEN SENT TO ME. IF YOU ACCEPT THIS PAYMENT YOU WILL BE DEEMED TO HAVE ACCEPTED THIS CONDITION.

THIS MONEY IS SENT ON CONDITION THAT YOU WILL HOLD IT AS A TRUSTEE ON MY BEHALF, AND THAT IT WILL REMAIN MINE UNTIL THE GOODS HAVE BEEN SENT TO ME. IF YOU ACCEPT THIS PAYMENT YOU WILL BE DEEMED TO HAVE ACCEPTED THIS CONDITION.

THIS MONEY IS SENT ON CONDITION THAT YOU WILL HOLD IT AS A TRUSTEE ON MY BEHALF, AND THAT IT WILL REMAIN MINE UNTIL THE GOODS HAVE BEEN SENT TO ME. IF YOU ACCEPT THIS PAYMENT YOU WILL BE DEEMED TO HAVE ACCEPTED THIS CONDITION.

THIS MONEY IS SENT ON CONDITION THAT YOU WILL HOLD IT AS A TRUSTEE ON MY BEHALF, AND THAT IT WILL REMAIN MINE UNTIL THE GOODS HAVE BEEN SENT TO ME. IF YOU ACCEPT THIS PAYMENT YOU WILL BE DEEMED TO HAVE ACCEPTED THIS CONDITION.

Received from M.....

the sum of £.....

as a deposit towards.....

I UNDERTAKE TO HOLD THIS DEPOSIT TO YOUR ORDER AS TRUSTEE AND IT SHALL REMAIN YOUR MONEY UNTIL THE GOODS HAVE BEEN SUPPLIED TO YOU.

Signed.....

for (Company)

Both these forms have been devised by the National Federation of Consumer Groups. One pound sent to the organisation at 12 Mosley St, Newcastle upon Tyne, NE1 1DE (0632 618259) will get you a kit containing the forms and stickers above and detailed information on the scheme; or you can use the replicas printed here. The small labels are to be affixed to the back of your cheque(s). The larger form is for the company to sign and send back, so include an SAE.

When you add up micro equals ours.

You won't find another micro offering a range of benefits that add up like the Olivetti M20's. There's a choice of seven M20's ranging from a personal computer through to a highly intelligent workstation that can take you into a multi-user network.



A wider choice of software.

We've designed a range of software programs that includes general accounting, word processing, financial planning, spreadsheets and graphics. But if you find you need specialised software that is not available from us, the M20 offers a choice of four main operating systems (MS-DOS, CP/M-86, PCOS and UCSD-P*). So it can handle literally hundreds of different software programs to satisfy virtually every business or professional application.



True 16 bit technology for speed and efficiency.

Unlike some of its major competitors, the M20 is a true 16 bit personal computer. So it's more powerful than most micros.



Choice of 16 printers.

As the world's leading producers of electronic typewriters, we also lead in computer printing technology. We make no less than 16 printers compatible with the M20.



The M20 can talk to other office machines.

With its own built-in communications facilities the M20 can talk to other office machines such as typewriters, making them intelligent word processors and printers. And linked to a telephone and communications equipment it can access Prestel, mainframe computers, receive or send telex messages and even Autodial. So the M20 can take you further into office automation.



The M20 can handle new networking developments.

The M20 allows you to build a multi-user network incorporating a massive central memory for extensive file storage with fully integrated software for electronic mail and text and data processing. Building a network like this with any other company would normally mean having to buy components from separate manufacturers. Olivetti supply everything from a single in-house source.

We are pioneers in computer technology.

Our total investment in R&D is one of the largest in the world and is committed to advancing computer technology for the businessman. We developed the first true 16 bit personal computer for under £2000 and are the leaders in ergonomic design of computers.



The depth of service you'd expect from a multi-national company.

Our distributors are the best trained in Europe. Before they are allowed to so much as look at an M20 they are put through a comprehensive course at our very own school. And our force of 600 service engineers cover the entire country to give fast and efficient service.



Proven reliability in a computer marathon.

The M20 is one of the most reliable micro computers in the world. In fact, in a recent computer marathon, not one but two Olivetti M20 micro computers ran non-stop, day and night, for a full week without even a single hiccup.



Experience that helped us become the leading European manufacturer.

For 75 years we have been helping all sizes of business become more efficient. No other company has this understanding of the businessman's needs combined with over 30 years experience in computer technology. Olivetti is now the largest European manufacturer of computer and office equipment. So we will always be around whenever you need us, unlike a lot of computer manufacturers who won't even be in business in a few years time.



At £1,795 it doesn't just add up to a better computer, it adds up to complete office productivity.

The Olivetti M20 is available now from only £1,795 or £9.88 per week to lease (plus VAT). And unlike most micros, it comes complete with free manuals and a one year guarantee. For more information on how to take your business into complete office productivity, complete the coupon.

the facts, no other



The M20 CQ, just one of the M20 range.
Dual disc drive, high density disc storage and
colour graphics.

To: Valerie Belfer, British Olivetti, Olivetti House, 86-88 Upper Richmond Road, Putney, London SW15 2UR.
Tel: 01-785 6666. Please send me brochures on the M20 personal computer.

NAME _____

POSITION _____

COMPANY _____

ADDRESS _____

TEL NO. _____

olivetti



LIGHT WRITING

Light pens are a popular add-on. Piers Letcher looks at four for the BBC and Commodore 64.

We're taught to read at an early age. Then we're taught to write. Learning to type is another step in the ladder, and one that's fast becoming essential to computer users—or maybe it's not. Lightpens, and other input and output devices such as mice, joysticks and touch screens, move micros further and further away from the unfriendly keyboard.

Lightpens can be used in graphics drawing programs as controllers of menu driven software and in computer aided design and manufacture (CAD/CAM).

They can also enhance games, and be used from within your own programs.

How do they work? The name 'lightpen' is a bit of a misnomer: the screen draws on the pen rather than vice versa.

A television picture is made up of just one spot of light. This spot starts at the top left hand corner of the screen, and moves from left to right across the top. It then works down the screen, zig-zagging its way down the 625 lines to the bottom right hand corner. When it gets there it pauses before starting its journey again. This happens 25

times a second, which creates the illusion that the picture is produced in one go.

When you place the lightpen on the screen the passing dot triggers a light sensitive detector in its tip. Since both the moment when the dot started that particular journey and the time of triggering are known, the exact position of the lightpen on the screen can be calculated.

This means the electronics inside a lightpen are not as sophisticated as you might think—in fact the special chips in the 64 and BBC are more complicated. The ▶

PCN PRO-TEST SOFTWARE



An artist's impression on screen

6845 CRT screen controller in the BBC enables the screen modes to be set, and can be used to calculate the X and Y coordinates from a lightpen. The same chip is used in the Lynx.

Lightpens for the Commodore 64 and the BBC are compared here, since these machines have the chips that add to the quality of their lightpens.

BBC

Datapen There are also versions for the Dragon, Vic-20 and 64 (tested below). It is light, cream coloured and, being oblong with the edges smoothed off, it felt rather uncomfortable.

Each version comes with an instruction booklet, demo cassette and machine specific sheets including a listing of a routine to use the lightpen from your own programs.

A sensible length of cable (about 3ft) plugs into the BBC's analog port. At the back end of the pen a small light emitting diode (LED) glows when the lightpen picks up the TV's dot. Inside the pen are electronics which discriminate between light from the screen and ambient light.

Under normal conditions the pen picks up light from the TV at a distance of up to roughly one inch under normal conditions, so there's a switch on the side to tell the program when you want it to read the pen.

Holding the pen and pressing the switch at the same time is awkward, especially for fine drawing. The pen tends to shake a little, though practice improves this and the rubber tip supplied with the pen helps. The tip is put into the nozzle so you can glide the pen across the screen without scratching. Using the tip increases the accuracy of the pen but reduces the amount of light coming into it, so the brightness must be turned up when the tip is attached.

The software supplied with the pen includes a sketching program and a user defined graphics (UDG) program, and the routine from the documentation was also on the cassette. This is well documented, and easy to fit into your own programs.

RH Lightpen The RH is the most expensive pen reviewed here, but it's the best I've used. It comes in two distinct parts: the pen itself (round and comfortable to use) and a box of interface electronics to control it.

The extra package allows control of several hardware aspects of the pen (eg sensitivity). Lightpen control isn't entirely governed by the BBC's 6845 CRT controller chip, so it's up to the pen's designers to ensure the signal sent to the host system is as smooth and accurate as possible. Most designers don't bother, but RH has.

The all-metal construction of the pen gives it a solidity that plastic lacks. The tip acts as a microswitch and there is a small LED at the back. About three feet of shielded cable connects it to the interface unit, which has about a foot of ribbon cable plugging it into the analog in port.

Unfortunately, the end of the pen is rather sharp and could cause minute scratches on the screen.

Several programs are provided on a cassette, including a machine code driver, utilities, a game and a drawing program.

With the utilities, pinpoint accuracy can be obtained quite quickly.

However, the RH is let down by appalling documentation. Fortunately, you can use it by intuition. Parts of the manual are so technical that they need detailed electronics knowledge.

Although expensive, the RH is a joy to use. With improved documentation it could even be used in educational establishments.

Commodore 64

Datapen With the Commodore 64 Datapen the brightness and contrast had to be turned right up to make it work effectively — very uncomfortable on the eyes. With the rubber tip attached the problem was worse, though the accuracy improved. The screen resolution was about four pixels by two, giving 80 by 100 identifiable screen positions.

The documentation for the Datapen is a bit sketchy and unclear. The machine specific sheets include a routine to use from your own programs, part of which is a machine code section to read the light pen values.

It's a good idea to give away demo programs but a pity Datapen's are generally abysmal, with little control from the lightpen.

Stack Lightpen The Stack is chunky and robust, though not as attractive as the Datapen. The switch mechanism is in two touch-sensitive bands, making it less easy to use than the Datapen, though it has the same resolution.

The documentation consists of two pieces of photocopied paper, but they are informative and clearly written. It includes a routine which, though not in machine code, provides much more control.



Airbourne antics with the RH Lightpen

Stack also provides a games cassette which works perfectly, though applications software may be a better bet for lightpen control.

On the whole the Stack gave a better performance than the Datapen. Control was more definite and with the selection of software available you're not left to your own devices.

Pixstick The Pixstick is the latest lightpen for the 64. It comes as part of a package including lightpen, Pixstick drawing utility, three games and documentation on how to use the program supplied, as well as using the pen from your own programs.

The lightpen is made of black plastic, and comes with about two feet of coiled cable. It is a thin oblong shape which you might find odd to use and hard to handle because of the pull from the coiled telephone-style cable. The lead plugs into port 1 and since it lacks a contact switch, has to be controlled from software. It has no LED indicator, so it's hard to confirm that a selection has been made.

The Pixstick drawing program is one of the biggest selling points of the package since it offers many drawing features and is fun to use. The lightpen does all on-screen drawing and placing of co-ordinates. Selecting each option is done via the left hand shift key, which is rather impractical as it's so close to the RUN/STOP key — the space bar could have been used for this function.

In use with the Pixstick drawing program, pictures can easily be drawn and saved to tape or disk. A major drawback of this pen is that it's not very sensitive, so when used with the drawing program the brightness was to be turned up to an uncomfortable level to enable work on all colours.

Verdict

With lightpens the standard of software support makes a major difference, and since it's not possible to make one that's compatible with all software, the utilities provided are very important. None of the pens for the 64 have the kind of pinpoint accuracy of the RH, but the Pixstick was fun to use — notwithstanding the brightness required to make it effective. **PCN**

Product Datapen Machine BBC and Commodore 64 **Other Versions** Vic-20 and Dragon **Price** £25 inc VAT + p+p **Manufacturer** Datapen Microtechnology, Kingsclere Rd, Overton, Hants RG25 3JB (0256) 770488 **Outlets** Retail and mail order from Datapen.

Product RH Lightpen Machine BBC **Other Versions** None yet **Price** £45.95 inc VAT **Manufacturer** RH Electronics, Chesterton Mill, French's Rd, Cambridge (0223) 311290 **Outlets** Acorn Dealers and mail order.

Product Pixstick Machine Commodore 64 **Other Versions** Vic-20, BBC and Atari **Price** £29.95 inc VAT + p+p **Manufacturer** Computapix, Gores Rd, Kirby Industrial Estate 051-547 2741 **Outlets** Retail and mail order.

Product Stack Lightpen Machine Commodore 64 **Other Versions** BBC, Vic-20 and Atari **Price** £28.75 **Manufacturer** Stack Computers, 290-298 Derby Rd, Bootle, Merseyside 051-933 5511 **Outlets** Retail and mail order.

Turbo Extended Basic



TURBO extended BASIC adds the following 45 POWERFUL, EASY TO USE COMMANDS to your Commodore 64:-

SPRITES

BCOL
MOF
MOVE
MULT
OFF
PUT
SCOL
SDT
SPRITE

GRAPHICS

BDR
CIRCLE
CLG
DRAW
FILL
HIRES
INK
LINE
PAPER
PCOL
PNT
PRESET
PSET

UTILITIES

AT
CLD
CSV
DELETE
DOKE
HALT
HIM
JUMP
KEY
LOM
MODE
OLD
PAUSE
POP
RENUM
REPEAT
SWOP
TEXT
UNTIL

MUSIC
CLS
SOUND
SYNTH
WAVE

ONLY

£14.95!

CENTRONICS
INTERFACE FOR THE
COMMODORE 64



ONLY **£29.90** inc VAT
& P&P
CENTRONICS PRINTER

CABLES FOR:
BBC/ORIC/DRAGON
ONLY £12.99 inc VAT & P&P

AZTEC SOFTWARE

**17 Station Road, Mirfield,
West Yorkshire WF14 8LN**

**TRADE & EXPORT ENQUIRIES
WELCOME tel. 0924 492826.**



PRINTER EXTRAVAGANZA

We challenge you to find a better deal!



- SHINWA CP80 (DOT MATRIX) £194 + VAT = £223.10
- EPSON RX80 (DOT MATRIX) £218 + VAT = £250.70
- EPSON RX80FT (DOT MATRIX) £247 + VAT = £284.05
- EPSON FX80 (DOT MATRIX) £324 + VAT = £372.60
- EPSON FX100 (DAT MATRIX) £437 + VAT = £502.55
- DAISY STEP 2000 or UCHIDA DWX 305
(new low cost - high quality Daisysheet) £279 + VAT = £320.85
- JUKI 6100..... £379 + VAT = £435.85
- CCP 40 (New amazing portable 4 colour printer/plotter)
..... £109 + VAT = £125.35
- DYNEER (Daisysheet) DW16 Parallel £299 + VAT = £343.85
- BROTHER HR15 £389 + VAT = £447.85

THE FABULOUS

STAR PRINTERS



- STAR GEMINI 10x £198 + VAT = £227.70
- STAR DELTA 10 £325 + VAT = £373.75
- STAR GEMINI 15x £325 + VAT = £373.75
- STAR RADIX 10..... £499 + VAT = £573.85
- STAR RADIX 15..... £599 + VAT = £688.85

- NEW LOW PRICES
- MT 80 (DOT MATRIX) £194 + VAT = £223.10
- OKI MICROLINES..... **NEW LOWER PRICES - CALL**
- FIDELITY 14" COLOUR MONITOR & COMPOSITE VIDEO
..... £189 + VAT = £217.35

We have interfaces for all types of computers, including CBM 64, VIC 20, APPLE, TRS 80, IBM, BBC, SPECTRUM, QL, etc.

MANY MORE PRINTERS AVAILABLE - OVER 200 SCI(UK) BARGAINS
SEND NOW FOR OUR FAMOUS CATALOGUE



24 HOUR SECURICOR DELIVERY £9.50 plus vat • BANKERS ORDERS, BUILDING SOCIETY CHEQUES, POSTAL ORDERS - SAME DAY
ALL ORDERS COVERED BY THE MAIL ORDER PROTECTION SCHEME • NATIONWIDE MAINTENANCE CONTRACTS ARRANGED

WE WILL MATCH ANY GENUINE PRICE. SCI(UK) IS NEVER BEATEN ON PRICE

DEALER ENQUIRIES
WELCOME.
WRITE FOR DETAILS

SCI(UK)

SCI(UK) FREEPOST (No Stamp needed)
PETERSFIELD HANTS GU32 2BR

0730 63741

EXPORT ENQUIRIES
NO TAX
DELIVERY AT COST

For the lowest Prices of Printers in the UK consult this Advertisement

VASM



The VASM System Vidsa Rebus 6502 Ass v2.0C Page: 0001

```

001 *# The VASM System
VASM is a complete DISC-BASED Assembler
and INTEL File Locator System in ROM,
especially designed for use with standard
text editors such as View and Wordwise.
With VASM it becomes possible to develop
professional machine code programs in a
professional way.
002
003
004
005
006
007
008
009
010
011
012
013 cond not rswv
014
015
016 org $8000
017
018
019
020
021
022
023
024
025
026
027
028
029
030
031
032
033
034
035
036
037
038
039
040
041
042
043
044
045
046
047
048
049
050
051
052
053
054
055
056
057
058
059
060
061
062
063
064
065
066
067
068
069
070
071
072
073
074
075
076
077
078
079
080
081
082
083
084
085
086
087
088
089
090
091
092
093
094
095
096
097
098
099
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000

```

- Professional 6502 Assembler for Disc Systems
- Industry Standard Intel Files
- Compatible with Standard Editors (expands tabs)
- Full Documentation

ORDER
YOURS
TODAY !!

Now your BBC Computer can be used to develop any size machine code program - in one go! Facilities include Cond.Assembly, Pseudo-Ops., Ext.Libraries, Paged O/P, Local Labels etc. For quality development - use VASM!

see PRESTEL 288 050 49 VAT REG. NO. 403 9099 54

Symbols: 1928 BUF 0015 BUFLFN 1922 DATA 190E NEG3 FFE5 OSASCI 0000 ROMV 1900 START

VIDAS REBUS

0000 error(s) detected 628F bytes free PO Box 256 Watford. HERTS. WD1 8HY Tel (0923) 53514

It's easy to complain about an advertisement. Once you know how.

One of the ways we keep a check on the advertising that appears in the press, on posters and in the cinema is by responding to consumers' complaints.

Any complaint sent to us is considered carefully and, if there's a case to answer, a full investigation is made.

If you think you've got good reason to complain about an advertisement, send off for a copy of our free leaflet.

It will tell you all you need to know to help us process your complaint as quickly as possible.

The Advertising Standards Authority. If an advertisement is wrong, we're here to put it right.

ASA Ltd, Dept 1 Brook House, Torrington Place, London WC1E 7HN

This space is donated in the interests of high standards of advertising.

VIC 20

Turn of a card

Name Patience System Vic 20 plus 3K 8K or 16K memory expansion
Price £9.99 **Publisher** Commodore, Ajax Avenue, Slough (75) 74111
Format Cassette **Language** Basic
Other versions None **Outlets** Commodore Dealers

Patience players bored with dealing the cards will be interested in this game. You should be warned, however, that no cheating is allowed. The trade-off is that the machine will not allow such mistakes as placing red on red.

Objectives

You must sort the cards into four suits after putting them red on black in the old familiar fashion. Each suit must be in ascending order from ace to king. The computer merely frees you from moving the cards about.

In play

You are first asked if you want to see the instructions.

Once the main program is loaded and the random number generator has done its stuff and 'shuffled' the cards, you are shown the starting point: seven columns of cards, ranging from one to seven cards in each column. All the cards are face downwards, except the last. The remaining cards are placed face down in an area at the bottom of the screen, labelled 'deal'.

It is not very likely that you

will be able to place a card on the 'suits' area immediately, so you must try and improve the situation by laying the cards in descending order on the columns, until the card you need for purposes of building up the suits is exposed.

It is easy to control the action. The commands are shown on the screen in abbreviations, and they work like this: 'M' moves a card to the chosen column, provided this is a legitimate move. 'P' plays a dealt card onto the designated column. 'D' deals a new card. 'S' transfers the card which you have successfully revealed into the 'suits' area. 'C' cancels the game you are playing, and gives you the chance to start again.

The game is faster than the card game it copies. Should you decide to transfer a run of cards from one column to another, it's done instantly. Any following card is also turned over automatically.

Verdict

The game has been carefully thought out. Within the restraints of the amount of information shown the screen displays are well designed. Colour has been put to good use, and a very limited but appropriate amount of sound has been added. But I can't help wondering who would want to play Patience on a micro.

Barry Miles

RATING (/5)

Lasting appeal



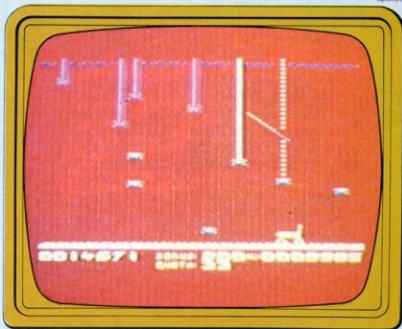
Playability



Use of machine



Overall value



Cosmic capers

Name Metagalactic Llamas Battle at the Edge of Time **System** Vic 20
Price £6 **Publisher** Llamasoft (07356) 4478 **Format** Cassette
Language Machine Code **Other versions** None **Outlets** Mail order/Retail

From the man who's brought you more llamas and camels than you care to name, this latest offering should delight everyone from newcomers to arcade junkies.

Objectives

As a metagalactic llama you live comfortably on some outpost of a forgotten part of the galaxy, doing what metagalactic llamas do.

Suddenly, all this calm is devastatingly ended by an attack from ZZyaxian cyborg arachnid mutants (spiders). These crawl down the screen on their webs, and on reaching a certain point, or if you shoot the web, they fall to the ground and mutate into disgusting weeviloids. Next, they start to crawl along the floor after you, poor defenceless llama, all alone in the screen's centre.

Well, not quite defenceless. You are armed with lasers in your spit, and you do have control over an experimental Planar field generator.

So, the battle commences and in the best tradition you must destroy everything before it gets you. With 99 levels of play (yes, ninety nine) who will survive? Llama, or weeviloids?

In play

Considering this is written for

the unexpanded Vic, you could be forgiven for thinking the programmer had slipped in a few extra K of memory with the cassette.

You start by choosing one of 32 skill levels. That done, it's all hands to the joystick and the action commences.

On the lower levels the spiders appear singly, and crawl along at fairly slow speed. Your laser spit can travel a reasonable distance and can bounce off the sides of the screen. Though it wields death to the spiders you fortunately can't shoot yourself.

The Planar field generator is in fact a horizontal line you can move up and down the screen. Laser spit also bounces off this, so putting it into the right position can mean an early destruction for some unlucky spiders.

Weeviloids require some skilful shooting and faced with two weeviloids you might as well forget it.

It gets ever more frantic, as the waves of spiders come down at ever increasing speeds. Everyone will have a try at level 32, but they won't last more than a few seconds.

Conclusion

A good, if not a great, game. You probably won't while away too many evenings, since it does begin to pall after a while, but for those first few games you will not believe that it's an unexpanded Vic in front of you.

Pete Gerrard

RATING (/5)

Lasting appeal



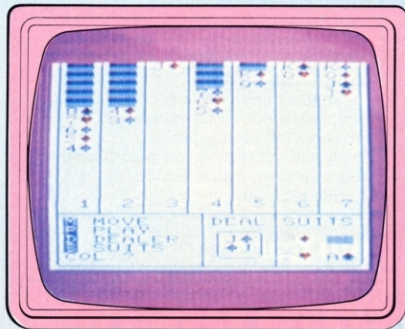
Playability



Use of machine



Overall value



COLOURJET

7 COLOUR INK JET PRINTER

Logic seeking in
dot address mode

£499 + VAT

With Centronics parallel interface
and free BBC Micro dump listing.

Prints overhead transparencies

Options available:

- Buffered RS232 interface.
- Viewdata & RS232 interface.
- Apple II interface.
- IBM PC dump.

Specifications:

640 dots/line & 128 dots/line Hi res.

84 dots/inch both axes.

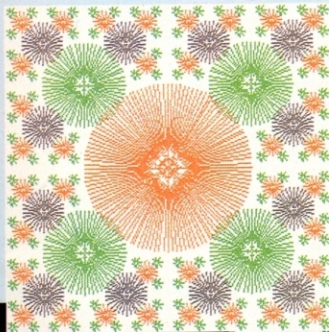
Friction feed rollpaper with single sheet
feed A4.

37cps in full colour.

Ink cartridges, 4 million character life.



from BBC Micro screen — 1/2 size mode



Virtually
silent



INTEGREX LTD.

Church Gresley, Burton-on-Trent, Staffs DE11 9PT
Tel: 0283 215432 Telex: 377106

Dealers, OEM & Educational
enquiries welcome

ORIC

Loki goes loco

Name **Loki System Oric 1** 48k Price £6.45 Publisher **Joe the Lion**, 213-215 Market Street, Hyde, Cheshire Format **Cassette** Language **Machine Code** Other versions **None** Outlets **Mail order/Retail**

Do you sometimes feel your fate is in the hands of the Gods? Well here's your chance to turn the tables and make your bid for immortality, and I reckon this is just about the best game so far on the Oric.

Objectives

You are Loki, the Norse Gods' very own black sheep. And you're out for revenge after the other immortals have imprisoned you for thousands of years. Despite the lengthy tour of Norse mythology provided on the inlay the game has little to link it to legend.

In play

The instructions in the program are as brief as those on the cassette liner are lengthy. Certain vital bits of information, such as where you are on the screen, are omitted, and the 'up' and 'down' controls are actually redundant for the first three stages. I wasted a good deal of time trying to jump over things.

You can play with a joystick or from the keyboard. Not having a joystick to hand I found the keys fairly well-placed and comfortable: Y/U for left-right, K/M for up/down.

You start at ground level, moving very quickly and trying to kill everything that comes at you. The landscape is a striking orange crossed by numerous geometric valleys. The various God-like foes appear grouped on the horizon.

Having escaped from the Earth you arrive in space. And here the fun really begins. With four directions of travel now available you can pitch and wheel among the stars at will. At this level it's difficult to hit anything, and it's even more difficult to tell when you have.





The whole game is accompanied by an impressive soundtrack; the space stages are particularly good, with the threat of impending motion sickness being heightened by what can only be described as a drunken astronaut's hornpipe.

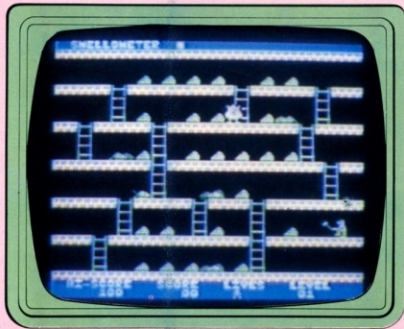
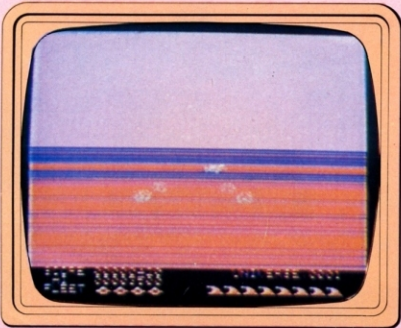
But my Godly prowess wasn't enough to get me through the black hole to explore the final stages of the game. No doubt they're just as exciting as the rest.

Verdict

This game is of a remarkably high standard, especially given the limitations of the Oric. I'd be hard pressed to think of any arcade game that combines the use of graphics and sound to better effect, so if you own an Oric you need this game. All credit to Joe the Lion.

Ian Thornton

RATING (5)
 Lasting appeal 
 Playability 
 Use of machine 
 Overall value 



Smelly business

Name **Rat Splat System Oric** Price £7.95 Publisher **Tansoft** Cambridge (02205) 2261 Format **Cassette** Language **Machine Code** Other versions **None** Outlets **Mail order/Retail**

When Hamelin was infested with rats the Pied Piper enticed them out with his flute. In this game you, as a psychopathic rat-catcher, cruelly splat your victims over the head with a hammer.

Objectives

You must rid a sewer system of rats which have infested it for years. Cheese has been laid out to attract the rodents and during the annihilation you must ensure this supply does not run out. The dilemma is whether to concentrate on saving cheese or killing rats. If 15 rats snuff it you get bonus cheese.

There are other hazards to be reckoned with. Noxious cheesey fumes are increasing all the time, as shown by the smellometer, and if you are not pretty snappy the pungent aroma will overcome you. Also, the rats have a monster chum, sentimentally attached to his furry friends. He looks harmless enough bouncing around the sewers with an inane grin, but his touch is fatal to rat executioners.

In play

The screen is filled with sewers on six levels connected by ladders. There are 32 lumps of cheese scattered liberally about and rats scurry around waving their tails and gobbling the

cheese at an alarming rate.

With six control keys you direct a harassed little rat catcher who, hammer in hand, runs up and down the different levels chasing after very agile rats. The best time for execution is when they sink their teeth into a tasty hunk of cheese: save the cheese and notch up one raf. The slow but sly monster chum may materialise at any moment, sometimes right beneath your feet with disastrous consequences. Exchanging your hammer for a monster aerosol and spraying the beast makes it sink into the sewer floor.

Points are scored for kills and a high score is shown between games.





The graphics are good with the rats whizzing around at great speed. As you approach they hesitate, then turn and scurry away. Sound is used to good effect — there is a short musical introduction, almost recognisable as Scott Joplin; a loud buzzing noise to warn you of oncoming monsters; the squeaking of the rats and a rather satisfying squelch as you hit them.

Verdict

This is a fast single-level game and therefore quite hard to get far with at first. And as your rat-killing skill develops quickly, it's not really varied enough to sustain interest for very long.

Computer games now simulate touch, sight and hearing. Maybe smell will be next, but please — not in this game.

Nickie Robinson

RATING (5)
 Lasting appeal 
 Playability 
 Use of machine 
 Overall value 

ATARI

Game, set and match

Name Tennis System Atari
400/800/XL Price £28.95 Publisher
Atari Format Cartridge Language
Machine code: Other Versions None
Outlets Centresoft stockists.

You can thrash McEnroe in straight sets in this brilliant video version of the sport.

Objectives

Play a singles match against the computer or against another player, or try a doubles match with you and your Atari against an opponent and Atari.

The game follows the proper rules of tennis as far as possible. Each match is the best of three sets, with normal scoring (including tie-breaks) and players changing service and ends at the right times.

In play

Your player stands on the base line, bouncing the ball. A

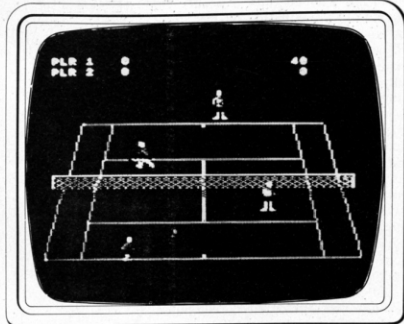
touch on the fire button and you serve to the forehand. Pull back on the joystick before serving and you serve to your opponent's backhand instead. The joystick controls your player. Don't worry about manipulating the racket — just get your player near enough to the ball and you automatically hit it.

The ball casts a shadow in flight — get to it before it bounces and the chances are you will execute an unstoppable volley.

Once you've got the hang of this, you can start trying to place your return. Assuming you've reached the ball, pressing the fire button causes your player to execute a lob. If you move the joystick and press fire simultaneously, the ball returns in the direction of the joystick movement.

Doubles is tremendous fun. The Atari controls your partner who fortunately plays a pretty mean game — so good you can sometimes almost sit back and enjoy the rallies.

The players are beautifully



animated — services, in particular, look impressively natural.

The players can run to any part of their half of the court, covering side-line to side-line and base-line right up to the net. The ball bounces with a convincing thud and you hear a satisfying thunk as racket meets ball. Scores are given at the top of the screen.

Verdict

An ace of a program and as

realistic a game of computer tennis as you're ever likely to get or want. The perspective, graphics and animation add up to a very impressive simulation indeed. Game, set and match to Atari Tennis.

Bob Chappell

RATING

Lasting appeal	★★★★★★
Playability	★★★★★★
Use of machine	★★★★★★
Overall value	★★★★★★

DRAGON/TANDY-£11.50
SPECTRUM-£17.25 inclusive

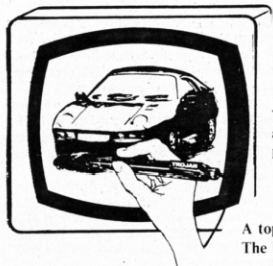
TOP VALUE LIGHT PEN
DRAGON 32/TANDY COLOUR 32K/SPECTRUM 48K

THE NEW ADVANCED PROGRAM

for the Trojan light pens include the following facilities-

- * DRAW BOX
- * DRAW CIRCLE
- * DRAW LINE
- * DRAW PICTURES FREEHAND
- * COLOUR FILL DESIGNATED AREAS
- * SAVE AND LOAD PICTURES TO AND FROM TAPE
- * FULL ERASE FACILITIES

All in Hi-Res screen in any of 4 colours for the Dragon/Tandy, and 8 colours for the Spectrum.



- * DATA ENTRY AND PROCESSING
- * MENU SELECTION AND CONTROL
- * GAMES PLAYING

This is a first class program which gives hints and tips on how to write programs for the pen. Ideal for many educational uses.

A top quality pen plus a first-class program. The best value pen package available.

Send cheques/P.O. to:
TROJAN PRODUCTS
166 Derlwyn, Dunvant, Swansea SA2 7PF
Tel: (0792) 205491

TROJAN 
Micro Computer Software & Accessories

ALSO AVAILABLE FROM GOOD COMPUTER DEALERS

PCN PRO-TEST SOFTWARE

Sinclair may be onto a winner by putting Micro-Prolog on the Spectrum for under £25. This powerful and sophisticated language, which is already available for several systems, has many attractions for educationalists and enthusiasts.

Features

Micro-Prolog (prolog stands for PROgramming in LOGic) is based on predicate logic, a language developed by logicians as a formal language of description. Prolog was chosen by the Japanese for their fifth generation computer project as the core language for designing expert systems. Micro-Prolog has been hailed as an ideal subset of Prolog for teaching programming in logic, rather than imperative languages like Basic. Thus, Prolog tells the computer what to achieve, not how to do it. It is well suited to query language applications, such as expert systems or databases.

That the package is designed to be a tutorial on Micro-Prolog is reflected in the example programs and primer.

This package offers quite a lot for your money. There's a cassette with Micro-Prolog, Simple (a front end program), several examples, an introductory booklet and the Micro-Prolog primer, all 301 pages of it. The user is left with a fair 25K to spare in which to, say, build an expert system.

Unfortunately, the tape version is not compatible with Microdrives and all saving and loading must be done to and from tape. It should be noted that there is a different cassette format with Micro-Prolog where data is loaded/saved in blocks with error checking all the way, thus making the cassette handling quite secure. Not so secure is the lack of documentation for the example programs: you are referred to the Micro-Prolog reference manual which was not available at the time of review.

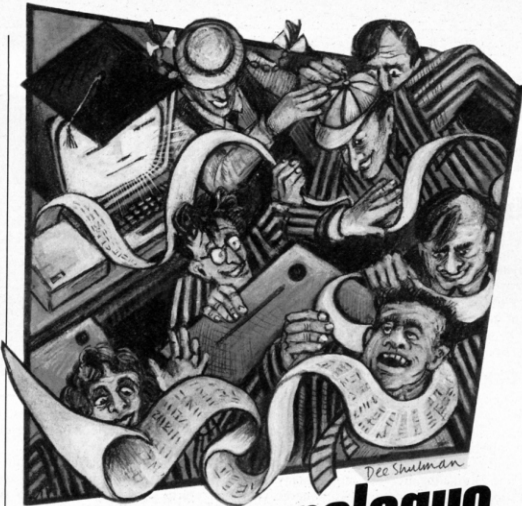
Simple is a front-end program which is loaded on top of Micro-Prolog and acts as a 'friendly' buffer between the novice and Prolog proper. Much use is made of the Simple front-end and I have my doubts as to the usefulness of this type of buffer.

Documentation

The introductory booklet on Micro-Prolog for the Spectrum is a know-nothing guide: maybe too simple at times, it does, however, gently guide you through the stages of loading Micro-Prolog and Simple. If you can't follow it, start gardening. Unfortunately, the Micro-Prolog primer is not so much simple as boring. The style is

A sample Prolog program & result

```
Define the sentences . . .
&. ADD (square above triangle)
&. ADD (hexagon above rectangle)
&. ADD (hexagon right-of square)
&. ADD (rectangle right-of triangle)
&. LIST right of
hexagon right-of square
rectangle right-of triangle
&. IS (square above triangle)
(Result) YES
```



Program prologue

Is Micro-Prolog the logical choice for learning Spectrum programming, asks David Janda.

yawn inducing from the start and I congratulate the teacher who could preach-the-Prolog-gospel using this hefty tome.

The exercises are not too hot either, being of the 'how many tennis balls will fit into a swimming pool . . .' type which makes a bad primer worse.

In use

Loading Micro-Prolog takes a couple of minutes, whereupon it's best to follow the leader and load the Simple front end and follow the examples. Doing your own thing might well result in confusion.

A particularly annoying aspect was the lack of the Spectrum's key-click which is not used. I soon found myself doing the ZX81 twitch, which involves pressing a key and looking up to see if it was right.

An editing facility is provided by allowing you to list a sentence, kill a sentence, or kill all, and there's plus intra-line editing using cursor keys five, eight and zero. Applications can be saved to tape by entering SAVE name. No quotes are needed, and unlike Spectrum Basic all input is letter by letter.

While loading, the name of the program is displayed together with the block number being read in. Altogether Micro-Prolog is safe to use and I never once crashed out to Basic.

When entering large sentences, which will no doubt have a large number of parentheses, a full stop and a number are displayed which shows you how many

brackets you have to close. This happens only when you have open parentheses and spill onto another line.

I was fairly impressed with the error checking, which made sense most of the time. Evaluation errors give a number which is not listed in any appendix. Syntax errors are catered for, to a degree.

Verdict

Before all you educationalists out there get excited about another language for the Spectrum, think again. Prolog may have been around for quite a while, and it may also be the 'fifth generation' language used by artificial intelligence experts round the world, but is it a programming language that you would want to use to teach your students programming?

One school of thought reckons Prolog is not so good because it encourages you not to think procedurally. To get a better idea, it might be advisable to read 'Beginning Micro-Prolog' by Richard Ennals.

RATING (5)

Features

■	■	■	■	■
---	---	---	---	---

Performance

■	■	■	■	■
---	---	---	---	---

Documentation

■	■	■	■	■
---	---	---	---	---

Reliability

■	■	■	■	■
---	---	---	---	---

Overall value

■	■	■	■	■
---	---	---	---	---

Name Micro-Prolog System ZX Spectrum Price £24.95 Manufacturer Logic Programming Associates Supplier Sinclair Research and dealers.

ELECTRONIC ART

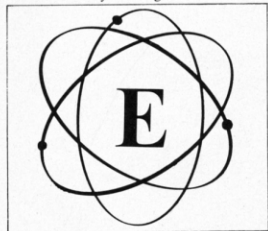
Kevin Bergin paints a favourable picture of Salamander's Graphics System.

This first graphics program to appear for the BBC's sibling allows the user to design a picture and save it, or part of it, to tape.

Characters, lines, circles and arcs are possible and the program has a number of features not often found in similar programs; but the best feature of the package is its ease of use.

Features

Graphics System gives the user a wide range of basic functions (see table below) and some handy drawing aids.



One is Shape Repetition, which repeats any of the functions in the table. For example, to repeat a box you move the cursor to a new location, then press **O** immediately after drawing a box.

Another drawing aid is Elastic Band; this gives a flashing line from the cursor to the last significant cursor position and no graphics package should be without it. A nice touch is that the angle between the elastic line and the previous line appears in the information window.

Finally, Grid puts a grid of dots over the screen, which can be toggled on and off and is useful for aligning parts of your picture.

Pressing **H** (for 'home') puts the cursor at the centre of the screen. **P** places the cursor at the last significant cursor position. Fast cursor movement is possible using numbers 0 to 9, which give preset screen coordinates. These are set when the user moves the cursor to a position, pressing **S** followed by a number. The cursor can then be moved quickly to one

Table—Graphics System

Arc	draws arc with specified radius
Box	draws a box—needs 3 point set
Circle	draws a circle of given radius
Fill	fills an area of screen with a given colour
Line	produces a line from current cursor position to any other position
Text	allows entry of text at any screen position

location from any other.

There are three drawing modes (0-2), and colours can be changed at any time.

The program allows you to save and load pictures using tape and a pointer can be set to let you save a portion of the screen—useful if the amount of spare RAM for screen storage is dwindling. Any picture may be redrawn in any other screen mode.

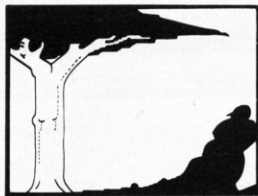
Presentation

The package comes in a nicely designed box; there is no backup program recorded on side two of the tape but there were no loading problems.

Three demonstration pictures are supplied on tape to give an idea of what can be achieved with a little patience and practice, and there is a well-written 25-page manual which takes you through the program in detail. Even so, it could take you some time to master the program and realize its full potential.

In use

The program is loaded with the **CHAIN** command. The first program sets up a screen display while the rest of the package is loading. A tone sounds when loading is completed and you are requested to select a mode. At this point the display is a little unusual and is possibly the most difficult feature to get used to.



The bottom three screen lines are reserved for commands and information such as current colour, colours available, x and y coordinates of the cursor and the percentage of picture memory used. Other information that may appear here covers saving and loading pictures, calibration and cataloguing.

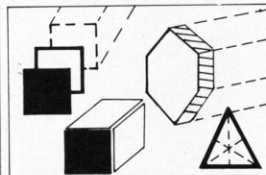
The cursor is a flashing cross in the centre of the screen which you can move by using the four cursor keys. A point may be 'set' by pressing the space bar. The various functions are selected with a single key stroke eg **D** puts you in drawing mode.

If you run out of memory for the current picture, it can be saved on tape and the picture memory reset. This leaves the picture on the screen to be completed, but to save the next part of the screen the pointer must be reset as it defaults to the



start of the screen. This facility allows complex images to be drawn and saved in different tape files. This multi-page procedure also means, however, that a really detailed picture must be loaded in several stages later.

Should you accidentally press **BREAK**, the program restarts with the picture memory cleared, possibly bringing you close to tears but is not lost after all. Your masterpiece may be recovered easily with the redraw command, one feature that could be improved.



Press **CTRL** and **BREAK** and the Electron is reset, and **OLD** restores the program.

Numerous prompts help you select whichever function you want. There are guidelines to help with perspective drawings as well as the grid function. The guidelines are dotted lines which appear from vanishing points on either side of the shape being drawn.

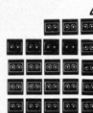
Verdict

Graphics System is pretty near foolproof. The areas which need care are breaking out of the program and using **Fill**, as it can overwrite portions of the screen.

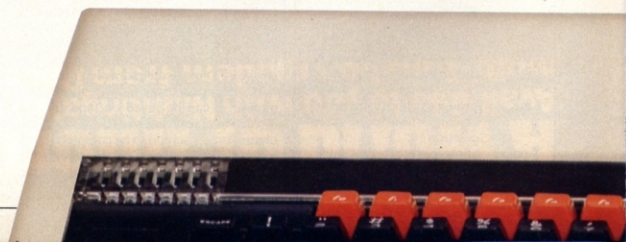
At just under £10, it's a valuable utility: it's so well designed it can be used by novice and expert alike.

RATING (5)

Features
Documentation
Performance
Usability
Reliability
Overall value



Name Electron Graphics System **System** Acorn
Electron Price £9.95 **Publisher** Salamander
Software, 17 Norfolk Road, Brighton, Sussex
(0273) 771942 **Format** Cassette **Language** Basic
and m/code **Other versions** Dragon **Outlets** Mail
order/Retail



Unicorn opens 5 new channels for the BBC.

The BBC Model B micro packs a lot of potential. As a basic computer, it is reliable, efficient and simple to use—but, more than that, it is the first step on the road to a complete computer system.

TORCH COMPUTERS have chosen the BBC micro as the heart of their open channel system—UNICORN. UNICORN means a wide choice of upgrade channels to transform your BBC into a complete business system, a fully communicating workstation, or a high-powered 32-bit data processor.

At the gateway to the Communications Channel is the UNICORN ZEP100—a 64K processor board and the software needed to promote your Model B into TORCHNET 9 local area network station. Further along the channel, the UNICORN FDP240 will provide twin 400K floppy disc drives, which with the addition of the ZEP100 will result in a Z80 disc pack.

The UNICORN Business Channel develops the BBC micro into a flexible professional tool equipped to manage the most complex business requirements. Opening with the HDP240—a simple but powerful disc drive, the channel provides for any level of upgrade from the well-proven ZDP240

(TORCH Z80 Disc Pack) up to the ultimate addition—the UNICORN—combining the HDP68K—a 32-bit 68000 processor with the UNIX[®] operating system.

And if you get lost in the by-passes and flyovers around your BBC, there is one simple route for you to follow—the straight channel to your nearest TORCH UNICORN dealer. He will assess your requirements, then recommend the ideal solution to cope with your present and future needs.

For full colour product brochure, price list and the name of your nearest TORCH UNICORN dealer, just clip the coupon.

UNICORN

Open channels for the BBC micro.

To: Torch Computers Ltd., Abberley House, Great Shelford, Cambridge CB2 5LQ. Telephone: Cambridge (0223) 841000.

Please channel further details on the Unicorn range to:

Name _____

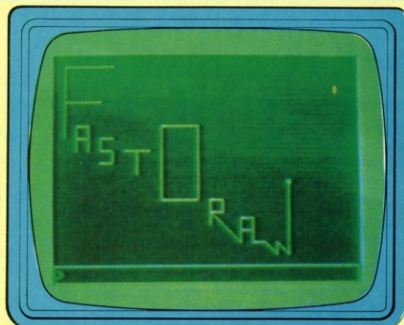
Address _____

PCN 28 3-84

Text and Graphics provided by BBC Model B.
Keyboard provided by BBC Model B.
Disc interfaces are necessary for use with the Unicorn range.

CP/M is a registered trademark of Digital Research Inc.
Unix is a registered trademark of Bell Telephone Laboratories Inc.

FAST DRAW
FAST DRAW
FAST DRAW
FAST DRAW
FAST DRAW



The DRAW command on the Dragon is a powerful graphics tool, but can be difficult to use effectively since the results of the commands cannot be seen straight away. Fastdraw from Timothy Bridge, of Manchester, overcomes this problem to some extent by allowing a command string to be created and seen immediately. All of the macro commands are covered except X, the substring command.

When entered these commands are printed on a 40 character line at the bottom of the screen, and when Enter is pressed the commands are drawn. The * command can be used to delete the last command entered and the ? command displays the last 39 characters of the drawstring. After the use of A, S or C unexpected results may occur. Press-

ing Clear followed by Enter will solve this. The program may stop with an FC error if a nonsense input is made but can be restarted with GOTO 1400 with no ill effects.

The program provides a good starting point for users interested in implementing Turtle graphics systems on their Dragons. The basic commands that need to be added are forward and turn. The program also provides a number of useful routines that may be extracted and used elsewhere.

This week sees the start of the utilities section of PCN programs. Each week a routine or program will be listed at the end of the main programs section. If you have any routines that you think will be of use to other readers, why not send them in for publication? Just send your routine on cassette together with some notes on what the routine does and how it does it:

Kenn Garroch
PCN Programs
Evelyn House
62 Oxford Street
London W1A 2HG

Remember, though, it must be your own work, not previously published elsewhere.

All contributions will be returned as soon as possible after I have had the time to look them over.

Title: Fastdraw
Machine: Dragon 32
Language: Dragon Basic
Application: Computer Art
Author: Timothy Bridge

notes					
10	Clear some string space.	70	Draw input box.	130	Key click.
20	Setup the syntax string.	80	Draw the input prompt.	140	If return then go to draw.
30	Setup string used to draw the cursor.	90	Get input.	150	If clear then clear screen.
40	Setup the play for the keyclick.	100	Option to list the last 39 characters.	160	If shift right arrow then clear command string.
50	Get into high-resolution mode.	110	Option to delete last input.	170	If up arrow then hard copy of BS.
60	Draw cursor.	120	Check input for a printable character (in CS), if invalid then tone.	180	If down arrow then load/save routine.

```

10 CLEAR 1000
20 C$="",-0123456789:ABCDEFGHIJKLMNRSUQ*+CH
R$(8)+CHR$(10)+CHR$(12)+CHR$(13)+CHR$(93
)+CHR$(94)
30 T$="S4A0BL1D1U2BR2DU1BL1"
40 PLAY"155V3104"
50 PMODE4,1:PCLS:SCREEN1,0
60 DRAW"BM120,96C1"+T$
70 LINE(1,175)-(254,190),PSET,B
80 DRAW"BM5,185S4A0B3H3":PX=11
90 K$=INKEY$:IF K$="" THEN GOTO 90
100 IF K$="?" THEN GOSUB 1290
110 IF K$="*" THEN GOSUB 1380
120 P=INSTR(1,C$,K$):IF P=0 THEN SOUND,
5:GOTO 90
130 PLAY"1"
140 K=ASC(K$):IF K=13 THEN GOTO 90
150 IF K=12 THEN PCLS:GOTO 90
160 IF K=93 THEN B$="":GOTO 60
170 IF K=94 THEN PRINT#2,F$:PRINT#2,B$
:GOTO 90
180 IF K=10 THEN GOTO 90
190 IF K=54 THEN GOTO 730
200 IF K=8 THEN GOTO 90
210 IF A$="" THEN GOTO 90
220 J=LEN(A$):A$=LEFT$(A$,J-1)
230 LINE(PX-4,195)-(PX,179),PSET,IF
240 PX=PX-4
250 GOTO 90
260 GOSUB 420
270 AS=A$+K$:GOTO 90
280 FORD=0 TO 100:NEXT D
300 DRAW"BM120,96"
310 DRAW T$
320 GOSUB 1240
330 DRAW "C0"+T$+"C1"
340 DRAW AS
350 DRAW "C1"+T$
360 B$=B$+A$
370 X$=A$
380 A$=""
390 L=LEN(B$):IF L>230 THEN GOSUB 910
400 LINE(2,176)-(253,199),PSET,IF
410 GOTO 80
420 DRAW"BM"+STR$(PX)+"",105:C1S4A0"
430 ON P GOSUB 450,460,470,480,490,500,5
10,520,530,540,550,560,570,580,590,600,6
10,620,630,640,650,660,670,680,690,700,7
10,720
440 PX=PX+4:RETURN
450 DRAW"BM+0,-3R4L2U2D4B+5,+1":RETURN
460 DRAW"BM-1,+0DGB+4,-2":RETURN
    
```


**NEW RELEASES FOR THE DRAGON 32/64
FROM SALAMANDER SOFTWARE**

TURTLE GRAPHICS

This program has been designed to provide a method of drawing pictures with your computer which is both fun and educational, and yet simple enough to be enjoyed by the young or inexperienced computer user and the enthusiast alike.

Pictures are drawn by telling the "turtle" to move forward and turn so that it traces a picture on your TV screen or 4 colour printer/plotter.

Powerful "repeat" and "word library" facilities allow you to build up new commands as you progress, and you can save your "word library" on cassette tape or floppy disc.

The end result of using a system such as this is an increased knowledge of geometry, and a basic understanding of simple programming, making the program an ideal educational tool for all ages.

- Snappy 32 page manual included.
- Runs from cassette or disc (using either Dragon Data DOS or Premier Microsystems DOS).
- Simple command structure.
- Repeat command sequences - can be nested to 32 levels.
- "Word" definition - can be nested to 30 levels.
- Powerful "word library" handling.
- Save and load library using cassette or disc.
- Dynamic editing of command strings and word library.
- Scaling and stretching commands.
- Will draw pictures on 4 colour printer/plotter (TRS-80 GCR115, MCP-40, or compatible plotter).

**Price
£9.95**



DATA RETRIEVAL SYSTEM

DRS is a powerful database package for the Dragon computer, supporting files stored either on cassette or disc (using the Dragon Data DOS).

DRS has been designed for ease of use and flexibility. You can design your own database, specifying number and type of fields. Powerful full screen editor allows easy design of your own screens.

DRS contains full facilities for adding, maintaining and deleting records. Fields may be added to or deleted from existing files even after records have been added. Search facilities allow for selection of records by any portion or combination of fields.

DRS also has an extremely flexible report generator, allowing for anything from printing of labels to pagged reports.

- 22 000 characters of data per file.
- 154 000 characters of data per disc file.
- Each record may contain a maximum of 480 characters, 26 alphanumeric fields and 10 numeric fields.
- Inclusive, exclusive and ranged searches on alphanumeric fields.
- Comparative searches on numeric fields.
- Add, delete and change records.
- User definable screen displays.
- User definable report generator.
- Record formats may be changed at any time.
- Disc files require Dragon Data DOS.

Price £14.95



Tape duplication by
DATA CLONE

Please add 50p P.&P. to all orders. Send A5 SAE for full catalogue.

Cheques or postal orders payable to:

Salamander SOFTWARE

17 Norfolk Road, Brighton, BN1 3AA. Telephone: Brighton (0273) 771942.

Look out for these other new releases from Salamander Software.

DRAGON: Wings of War £7.95 (WW II Adventure). The Cricklewood Incident £7.95 (Weird & Wonderful Adventure).

BBC: Eagle £7.95 (Original Arcade Action). Turbo £9.95 (BASIC Compiler)

PCN PROGRAMS: DRAGON 32

PCN PROGRAMS: DRAGON 32

FAST DRAW
FAST DRAW
FAST DRAW
FAST DRAW

```

190  If@ then go to help
      screen.
200  If not back arrow then
      don't delete character.
210  If AS is null then get
      another key.
220  Remove the last character
      from AS, due to back
      arrow.
230  Blank out the letter on the
      screen.
240  Move the print position
      back one place.
250  And another input.
260  Check to see whether the
      string will fit into the input
      box and go back to the
      main program.
270  Go to the print/draw
      character subroutine.
280  Add the letter to the input
      string.
290  Pause.
300  Reposition the draw start
      coordinates.
310  Draw all the current
      commands (contained in
      BS).
320  Check the total length via
      subroutine.
330  Rub out the cursor.
340  Draw the command in AS.
350  Draw the cursor.
360  Add the command to BS.
370  Store the last command.
380  Set AS to null.
390  Check the length of the
      command string.
400  Rub out the last input.
410  Go back and continue the
      program.
420  Start of the text drawing
      routine.
430  Pis obtained in line 120
      and points to the letter to
      be printed/drawn, from
      CS.
440  Move the print position,
      where the character is
      drawn, along by the width
      of a character and hence
      return a blank.
470  DRAW"BM+0,-3R4BM+4,3":RETURN
490  DPAW"BM+0,-1FR2EU4HL2GD4BM+8,+1":RE
      TURN
490  DRAW"BM+1,+0U6GBM+6,+5":RETURN
500  DRAW"BM+4,+0L4UEP2EU2HL2GBM+8,+5":RE
      TURN
510  DRAW"BM+3,-1FR2EUHL2R2EUHL2GBM+8,+5"
      :RETURN
520  DRAW"BM+3,+0U6G3R4BM+4,+3":RETURN
530  DRAW"BM+0,-1FR2EU2HL3U2R4BM+4,+6":RE
      TURN
540  DRAW"BM+0,-2ER2FDGL2HU4ER2FBM+4,+5":
      RETURN
550  DRAW"BM+2,+0U2E2U2L4BM+8,+6":RETURN
560  DRAW"BM+1,+0R2EUHL2HUER2FDGL2GDFBM+7
      ,+0":RETURN
570  DRAW"BM+0,-1FR2EU4HL2GD6FR3BM+4,+3":R
      ETURN
580  DRAW"BM+0,-5DBM+0,+2DGBM+5,+0":RETURN
590  DRAW"USER2FD5U3L4BM+8,+3":RETURN
600  DRAW"U6R3FDGFDGL3U3R3BM+5,+3":RETURN
610  DRAW"BM+1,+0HU4ER2FHL2GD4FR2EBM+4,+1
      ":RETURN
620  DRAW"U6R3FD4GL3BM+9,+0":RETURN
630  DPAW"R4L4U3R4L4U3R4BM+4,+6":RETURN
640  DRAW"U3R4L4U3R4BM+4,+6":RETURN
650  DRAW"BM+1,+0R2EULRDGL2HU4ER2FBM+4,+5
      ":RETURN
660  DRAW"U6D3R4U3D6BM+4,+0":RETURN
670  DRAW"R4L4U4BM+9,+3":RETURN
680  DPAW"U6F2E2D6BM+4,+0":RETURN
690  DRAW"U6DF4DU6BM+4,+6":RETURN
700  DRAW"U6R3FDGL3RF3BM+4,+0":RETURN
710  DRAW"BM+0,-1FR2EH4ER2FBM+4,+5":RETURN
720  DRAW"BM+0,-6D5FR2EUBM+4,+6":RETURN
730  CLS:PRINT@5,"input"CHR$(124)"output"
      CHR$(128)"commands":PRINT:PRINT"key
      function"
740  PRINT"*-----DELETE LAST CMD."
750  PRINT"AT-----HELP."
760  PRINT"CLEAR-----CLEAR SCREEN."
770  PRINT"SHIFT RT---CLEAR COMMAND STRIN
      G. ARROW"
780  PRINT"UP ARROW---HARD COPY OF COMMAND
      D.;"
790  PRINT"LEFT ARROW-BACK SPACE."
800  PRINT"ENTER-----ADD INPUT TO COMMAN
      D
      STRING AND DRAW IT."
810  PRINT"DOWN ARROW-LOAD AND SAVE COMMA
      ND
      STRING."
820  PRINT"?-----SHOW LAST 39 KEYS."
830  PRINT"    PRESS ANY KEY TO CONTINUE";
840  I$=INKEY$:IF I$="" THEN 840
850  CLS:PRINT@9,"draw"CHR$(128)"commands"
860  PRINT:PRINT:PRINT" THE DRAW COMMANDS
      ARE EXACTLY THE SAME AS THOSE FOR THE
      DRAGONBASIC DRAW COMMAND.":PRINT:PRINT"
      THE ONLY EXCEPTION IS THAT 'X' IS NOT US
      ED BECAUSE THERE ARE NOSUBSTRINGS TO EXE
      CUTE."
870  PRINT:PRINT:PRINT"    PRESS ANY KEY T
      O CONTINUE";
880  I$=INKEY$:IF I$="" THEN 880
890  'into hi-res and back to main program
  
```


A QUALITY LIGHT PEN SUPERIOR PERFORMANCE

- * Absolutely insensitive to ambient lighting
- * Responds to different colours and screen intensities without any adjustment of TV or monitor.
- * Red LED readout showing that data is available.
 - * Switch for program control (allows pen to approach the screen without erroneous data capture)
- * All features are Program accessible



SUPERIOR PROGRAMS

- * Good Documentation
- * Tape storage of your work
- * User routines provided on tape and printout
- * Freehand drawing program
- * Library menu drawing program (define your own library of shapes)
- * Example programs illustrating uses of the pen and its features

£25

inclusive of P&P

Please state DRAGON, BBC or VIC-20 when ordering. Send cheque or P.O. for £25 to:

Dept. PN2, Datapen Microtechnology Ltd, Kingsclere Road, Overton, Hants RG25 3JB, or send SAE for information sheet.

NOW ALSO AVAILABLE FROM GOOD COMPUTER STORES.
Datapen Microtechnology Limited

SIRIUS the apricot
USER CLUB

HOW TO MAKE A GOOD THING BETTER

- * Save hundreds of pounds with a more informed choice of software
- * Keep abreast of the latest developments
- * Exchange views and information with other Club Members
- * Bi-monthly newsletters * Regular seminars
- * Courses * Discounts on accessories supplied
- * Telephone advice Hotline for Members

FREE 20% discount vouchers to user Club sponsored seminars and courses

To: SIRIUS USER CLUB, Enterprise House, Gordons Street, Luton, Beds LU1 2QP (Tel: 0582 412214)

Name: Address

Tel:

I would like to know more about the Sirius User Club. I enclose cheque for £69 as my 1st year subscription to the Sirius User Club (I wish to save £11.50 and pay by Banker's Order the reduced rate of £57.50 p.a.)

BANKER'S ORDER

To the Manager, Bank (your Bank) Branch address

Your Account No.
Please pay to NATIONAL WESTMINSTER Bank George Street, Luton — Sorting Code No. 60 13 26 for the account of Sirius User Club (6389 39 83) the sum of £57.50 on date of receipt and thereafter on the same date each year unless cancelled by me. Please debit my account.

Signed Date PCN1

8th Seminar on Cadcam Graphics
16th APRIL — LONDON
30th APRIL — MANCHESTER

AND NOW — FOR BBC OWNERS — SOMETHING COMPLETELY DIFFERENT

BYTE DRIVE 500 BOOSTS THE BEEB!



ITL's Byte Drive 500 3" F.D.D. has already done wonders for Oric. Now for BBC Model B (with D.F.S.) we can offer a proven system consisting of:

- * DRIVE UNIT
- * INTERFACE CABLE
- * ZAP SOFTWARE PACKAGE
- * MANUAL

All at an introductory price of

£190 (+ VAT)

CONTACT YOUR LOCAL PERSONAL COMPUTER RETAILER. SUPPLIES NOW BEING DELIVERED TO U.K. & EUROPE. IN CASE OF DIFFICULTY CONTACT:

ITL Kathmill Ltd
The Old Courthouse, New Road,
Chatham, Kent ME4 4QJ.
Tel: 0634 409433

SYSTEM DESIGNED & ASSEMBLED IN U.K.

ONLY
£3.50

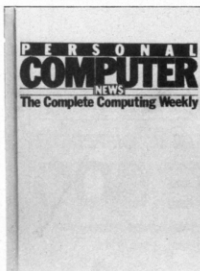
For sufferers of PCNitus THE PCN BINDER

Since March 1983, a mysterious malady has afflicted thousands of people in Britain — PCNitus. The symptoms are perplexing . . . Those afflicted are found fighting their way through piles of Personal Computer



News magazines muttering strange things like 'can't find the Electron Pro-Test' and 'The Spectrum Micropaedia must be here somewhere . . .' But a recent breakthrough has brought instant relief to PCNitus sufferers. The cure is called the *Personal*

Computer News binder. It's red, yellow and silver and holds four months' copies completely flat, even when full. You'll be able to read them easily and refer to them quickly.



So if you recognise the symptoms above — take the cure now!

Just fill in the coupon at the bottom of the page and send it with payment (£3.50 inc postage, VAT and handling) to the address below.

BINDER ORDER CARD. Please rush me _____ PCN binder(s) at £3.50 each. I enclosed my cheque made payable to Personal Computer News. Please charge my Access/Visa/Diners/American Express card (delete where not applicable)

Account No. Name

Address Town Postal code

Signed

Send to Personal Computer News, Binders Department, 53/55 Frith Street, London W1A 2HG

FAST DRAW
FAST DRAW
FAST DRAW
FAST DRAW

- 450-720 Drawstrings for the characters.
730-840 Print the help screen for the control commands.
850-880 Help screen for the draw commands.
900 Go back into high-resolution.
910-950 Inform the user that the string is too long.
960-1010 Load, save, merge information screen.
1020-1070 Save BS.
1080-1090 Erase the old cursor.
1100-1160 Load BS.
1170-1240 Merge a string onto the end of BS.
1250 Check the length of the new string.
1260-1270 Inform the user and chop the string to 255 characters.
1280 Pause and return.
1290 Start of 'print the last 39 characters' routine. Check to see if BS is nil.
1300 Set S to the length, up to 39.
1310 Delete any characters in the input box.
1320 Move the print/draw position to the correct place.
1330-1360 Use the text subroutine at 420 to print the characters.
1370 And return.
1380 Start of the 'delete last command' routine. Check BS for nil.
1390 Using XS remove the last command.
1400 Set XS to nil.
1410 And return.

```

900 SCREEN1,0:GOTO90
910 CLS:PRINT:PRINT"warning: COMMAND STR
ING IS":PRINT"CHARACTERS LONG. THIS MEA
NS YOU HAVE"255-L"CHARACTERS LEFT."
920 IF L>250 THEN PRINT:PRINT" please"CH
R$(128)"save"CHR$(128)"command"CHR$(128)
"string"CHR$(128)"now".
930 PRINT:PRINT:PRINT"    PRESS ANY KEY T
O CONTINUE"
940 I$=INKEY$:IF I$=""THEN 940
950 SCREEN1,0:RETURN
960 CLS:PRINT@9,"save and load"
970 PRINT:PRINT:PRINTTAB(12)"S    SAVE":P
RINT:PRINTTAB(12)"L    LOAD":PRINT:PRINTT
AB(12)"M    MERGE"
980 H$=INKEY$:IF H$="S" OR H$="L" OR H$=
"M" THEN990 ELSE980
990 CLS:PRINT:PRINT:INPUT" FILE NAME";F$
:F$=LEFT$(F$,8)
1000 PRINT:PRINT:PRINT"    PRESS ANY KEY WH
EN TAPE READY"
1010 I$=INKEY$:IF I$="" THEN 1010
1020 IF H$("<)"S" THEN 1000
1030 PRINT:PRINT:PRINT" SAVING ";F$
1040 OPEN"C",#-1,F$
1050 PRINT#-1,B$
1060 CLOSE#-1
1070 SCREEN1,0:GOTO90
1080 DRAW"BM128,96":DRAWB$
1090 DRAW"C0"+T$+"C1"
1100 IF H$="M" THEN 1170
1110 PRINT:PRINT:PRINT" LOADING ";F$
1120 OPEN"I",#-1,F$
1130 IF EOF(-1) THEN 1150
1140 INPUT#-1,B$:GOTO1130
1150 CLOSE#-1
1160 SCREEN1,0:A$="":GOTO300
1170 PRINT:PRINT:PRINT" MERGING ";F$
1180 OPEN"I",#-1,F$
1190 IF EOF(-1) THEN 1210
1200 INPUT#-1,A$:GOTO1190
1210 CLOSE#-1
1220 GOSUB1240:B$=B$+A$:A$=""
1230 SCREEN1,0:GOTO300
1240 M=LEN(B$)+LEN(A$)
1250 IF M<256 THEN RETURN
1260 CLS:PRINT"string"CHR$(128)"too"CHR$
(128)"long: CHOPPING TO 255CHARACTERS."
1270 A$=LEFT$(A$, (255-LEN(B$)))
1280 FORD=0TO1000:NEXTD:RETURN
1290 IFB$=""THEN RETURN
1300 IF LEN(B$)<39THENS=1ELSES=LEN(B$)-39

1310 LINE(2,176)-(253,198),PRESET,BF
1320 PX=11
1330 FOR T=S TO LEN(B$)
1340 P=INSTR(1,C$,MID$(B$,T,1))
1350 GOSUB420
1360 NEXT T
1370 RETURN
1380 IF B$=""THEN RETURN
1390 B$=LEFT$(B$,LEN(B$)-LEN(X$))
1400 X$=""
1410 RETURN

```

"Leaves the Atari, Dra and Lynx



Choosing a home computer is a bit like playing a video game. The more you play, the better you get. So you'd expect people who spend their working life choosing computers to be pretty good at the game. Quick to shoot down a fault. Pleased when they find an improvement.

Recently Which Micro? and What Micro? tested the Spectravideo SV 318. Here's what they had to say:

"Every home computer coming on the market tends to be hailed as revolutionary. For once this really has to be true with the Spectravideo SV 318."

"The first cheap, high performance computer..."

"Double precision numbers... are ideal for companies with turnovers under £999,999,999,999.99."

Spectravideo SV 318: Memory – 32K ROM expandable to 96K, 32K RAM expandable to 144K: Keyboard – calculator type, 71 keys, 10 function keys, built in joystick/cursor control: Graphics – 16 colours, 256 x 192 high resolution graphics, 32 sprites: Sound – 3 channels, 8 octaves per channel: CP/M* compatibility – over 3000 existing software packages: Storage – cassette drive, 256K disc drive capacity: Suggested retail price – £186.

Spectravideo SV 328: Memory – 32K ROM expandable to 96K, 80K RAM expandable to 144K: Keyboard – full word processor type, 87 keys, 10 function keys, built in cursor control: Graphics – 16 colours, 256 x 192 high resolution graphics, 32 sprites: Sound – 3 channels, 8 octaves per channel: CP/M* compatibility – over 3000 existing software packages: Storage – cassette drive, 256K disc drive capacity: Suggested retail price – £262.

A full range of peripherals are also available.

**Which Micro Hardware Review – Spectravideo SV 318

*CP/M is a registered trade mark of Digital Research Inc.

gon, Commodore 64 for dead.”

Which Micro? Dec 83. **



“...a far better job with its keyboard than anybody else using soft keys.”

“...most people will notice how easy it is to produce graphics with the Basic.”

“This is a BBC class machine.”

“As a computer for the enthusiast it is well nigh perfect.”

“A good micro for tomorrow.”

Obviously, they had more to say. And we think you should have a look at the reports for yourself to prove that we haven't exaggerated their independent opinions.

Fill in the coupon today and we'll mail you the reports as well as a full technical specification brochure in colour of this amazing new personal computer or see the Spectravideo for yourself at most leading computer stockists.

SPECTRAVIDEO™

SV-318 SV-328
PERSONAL COMPUTERS

Spectravideo Ltd, 165 Garth Road, Morden, Surrey SM4 4LM
Telephone: 01-330 0101. Telex: 28704 MMH VANG

To: Spectravideo Ltd, 165 Garth Road, Morden, Surrey SM4 4LM

I am interested in Spectravideo computers and peripherals. Please send me the latest reports together with a full technical specification brochure.

Name: _____

Address: _____

Tel. No: _____ STD Code: _____

PCN 283 84

Take the screen test and be a STAR!

in the *LiveWire* high score competition*

Use your skill and dexterity to win one of our fabulous prizes.

Free entry form in every game purchased

*only on Gridtrap 64 and Jumpin' Jack 64.

- PRIZES**
- 1st Commodore 1541 SINGLE DISK DRIVE
 - 2nd Commodore 1520 PRINTER PLOTTER
 - 3rd Commodore SIMONS BASIC CARTRIDGE

Seven runners up will receive the latest Pro-Ace joystick as prizes.

WATCH OUT FOR TRIAD 64 COMPETITION COMING SOON

more fabulous prizes to be won

GRIDTRAP 64 JUMPIN' JACK 64

We promise you won't be able to turn it off! It's a real skill tester and loads of fun to play!

Play with the Keyboard or Joystick. Choose your own operating keys with our **User Definable System**. Compete with an opponent by selecting **Two Player Mode...** Great graphics, super sound effects in the *LiveWire* tradition including a selectable Melody Mode where the tune is available at the touch of a key and Melody On is indicated by a quaver graphic.

Program No. LW04 £8.95

Not just a game... an Experience!
IT HAS IT ALL... EXCITEMENT... HUMOUR... STRATEGY

Jumpin' Jack leaps into a totally new look for the 64 created by **Three Dimensional Graphics** giving **Full Perspective** to the game... PLUS... hosts of features never seen before!

Submerging Turtles — Snakes — Crocodiles — Otters — Lady Frog — Dragonfly!!!

It's Fun ***
IT'S FROGRIFFIC ***

Program No. LW02 £8.95

TRIAD 64



NEVER BEFORE HAS A COMPUTER GAME LOOKED SO EXCITING... FELT AND PLAYED SO EXCITING...

Watch astonished as the Triad hurl themselves towards your craft in a remorseless battle against your intrusion.

Feel the heat blast of their anti-matter fields.

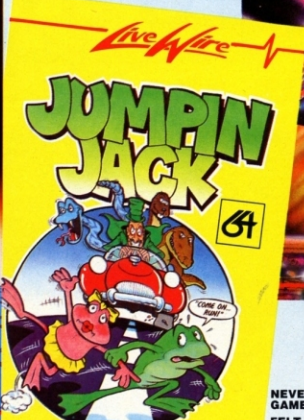
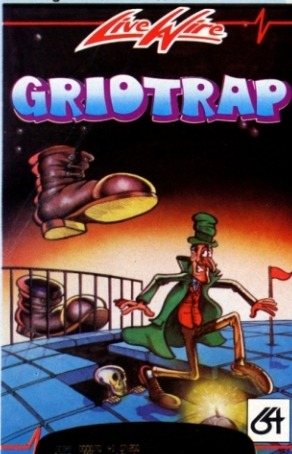
Your pulse laser will have to turn white hot before this encounter is over...

Featuring:-

A new **DIMENSION...**

Into the realm of **TOTAL PERSPECTIVE GRAPHICS...**

Program No. LW03 £8.95



Illustrated on GAME LEVEL 4

Clip the coupon and return to Sunlock Microwave Dept. PCN 281/3
198 Deansgate, Manchester M3 3NE.
or Telephone: 061-834 4233

Please send me the following Software

I enclose Cheque/P.O. for £ _____ inc. P + P U.K. only.

To: Name _____

Address _____

Post Code _____



Also available from good computer dealers and bookshops nationwide.

LiveWire
Software

198 Deansgate, Manchester M3 3NE.

Telephone: 061-834 4233

TRADE ENQUIRIES WELCOME

It's easy
to complain about
an advertisement.
Once you know how.

One of the ways we keep a check on the advertising that appears in the press, on posters and in the cinema is by responding to consumers' complaints.

Any complaint sent to us is considered carefully and, if there's a case to answer, a full investigation is made.

If you think you've got good reason to complain about an advertisement, send off for a copy of our free leaflet.

It will tell you all you need to know to help us process your complaint as quickly as possible.

The Advertising Standards Authority. ✓
If an advertisement is wrong, we're here to put it right.

ASA Ltd, Dept 1 Brook House,
Torrington Place, London WC1E 7HN

This space is donated in the interests of high standards of advertising.

INFERNAL COMBUSTION



Programs with
a new twist!

INFERNAL COMBUSTION
is a completely original, award
standard, all machine code game
for 48K Spectrum.

Put out the fires and save the
partaking people before the
building self-destructs. Outwit
the evil arsonist who will stop
at nothing to net the world on
fire!

INFERNAL COMBUSTION
is available by direct mail from
Storage Locks, 224 Ryvan Avenue,
London N22 5JF.

PRICE £5.50



AVAILABLE
AT LAST!

A DISK DRIVE FOR YOUR

ORIC

The unique BYTE DRIVE 500 system
as reviewed in issue 41 & 52 of P.C.N.

We offer the complete BD500 system ready to plug into
your Oric for just £299.95 (inc p&p & VAT)

Consisting of: 3" Disk Drive, Power Supply Unit,
Hybrid Interface DOS Master Disk containing
Word Processor, Demo Programs and Utilities,
and Operating Manual.

Or a Part System for use with existing 3" Orwes
for just £99.42 (inc p&p & VAT)

Consisting of: Hybrid Interface, DOS Master Disk
(as above) and Operating Manual.

Also available: Maxell CF2 3" Disks £57.35 per box
10 disks (inc p&p & VAT)

SOFTWARE AVAILABLE NOW

Home & Business Package

Contains: Database
Household Banking
Fuel Calculator
Mortgage/Interest Calculator. Just £19.95 (+£1
p&p)

Games Package

Contains: Pontoon, Golf, Horse Race, Diver, Mind-
bender, Sweeper, Target-Shoot, Hogger Bomber
With excellent graphics, full colour & sound. Just
£19.95 (+ £1 p&p)

p&p free when ordered with another item

MANY OTHER TITLES
AVAILABLE SHORTLY

FREE FREE FREE FREE FREE FREE FREE FREE

The first 100 orders for a complete BD 500 system will receive
A FREE GAMES SOFTWARE PACKAGE

Please send me:

... Complete systems	@ £299.95 £
... Part systems	@ £99.42 £
... Home & Business Packs	@ £19.95 £
... Games Packs	@ £19.95 £
... Boxes Disks	@ £57.35 £

Total £

I enclose cheque/PO No. All cash should be sent registered
N.B. Overseas ADD £20.00 P&P

Name

Address

Postcode

Send to: Tyrell Computer Systems Ltd., 41 Castle St,
Wellingborough, Northants NN8 1LW 0933-72092
Allow 28 days for delivery

LORDS OF TIME

Join our range of acclaimed pure-text puzzle adventures, at £9.90, for:

BBC 32K **COMMODORE 64 SPECTRUM** 48K **LYNX** 48K **NASCOM** 32K **ORIC** 48K **ATARI** 32K

ADVENTURE REVIEWS

"Adventures which have a fast response time, are spectacular in the amount of detail and number of locations, and are available to cassette owners. I am extremely impressed. The Level 9 Adventures are superbly designed and programmed, the contents first rate. The implementation of Colossal Cave (Adventure) is nothing short of brilliant; rush out and buy it. While you're at it, buy their others too. Simply smashing!"

—SOFT, Sept 83

"I found Dungeon exceedingly well planned and written, with a fast response. There are well over 200 locations and the descriptions are both lengthy and interesting. The objects number about 100. It could therefore take some months to explore the whole network, giving many hours of enjoyment in the process."

—C&VG, Sept 83

"The descriptions are so good that few players could fail to be ensnared by the realism of the mythical worlds where they are the hero or heroine... great fun to play."

—Which Micro?, Aug 83

"My appetite has been whetted and I intend to get my own copy (of Snowball) to play."

—What Micro?, Dec 83



ADVENTURE REVIEWS

"This has to be the bargain of the year. If adventures are your game then this (Colossal Adventure) is your adventure."

—HCW, 5 Sept 83

"Colossal Adventure is simply superb. Anyone who wishes to use adventures in an educational setting really must use and see this program as it emulates Crowther and Wood's masterpiece so well. For those who wish to move onto another adventure of similar high quality, Dungeon Adventure is to be recommended. With more than 200 locations, 700 messages and 100 objects it will tease and delight!"

—Educational Computing, Nov 83

Colossal Adventure is included in Practical Computing's Top 10 games choice: "Poetic, moving and tough as hell."

—PC, Dec 83

"To sum up, Adventure Quest is a wonderful program, fast, exciting and challenging. If you like adventures then this one is for you"

—NILUG #1.3

"Colossal Adventure... For once here's a program that lives up to its name... a masterful feat. Thoroughly recommended"

—Computer Choice, Dec 83

"wholly admirable"

—Your Computer, Sept 83

MIDDLE EARTH ADVENTURES

1: COLOSSAL ADVENTURE

A complete, full size version of the classic mainframe game "Adventure" with 70 bonus locations added.

2: ADVENTURE QUEST

Centuries have passed since the time of Colossal Adventure and evil armies have invaded The Land. The way is long and dangerous; but with cunning you can overcome all obstacles on the way to the Black Tower, source of their demonic power, and destroy it.

3: DUNGEON ADVENTURE

The trilogy is completed by this superb adventure, set in the Dungeons beneath the shattered Black Tower. A sense of humour is essential!

THE FIRST SILICON DREAM ADVENTURE

1: SNOWBALL

The first of Pete Austin's second trilogy. The giant colony starship, Snowball 9, has been sabotaged and is heading for the sun in this massive game with 7000 locations.

THE LORDS OF TIME SAGA

7: LORDS OF TIME

Our congratulations to Sue Gazzard for her super design for this new time travel adventure through the ages of world history. Chill to the ice-age, go romin' with Caesar's legions, shed light on the Dark Ages etc. etc. We'll be selling this game mail-order from January 1st.

Price: £9.90 each (inclusive)

Level 9 adventures are available from good computer shops, or mail-order from us at no extra charge. Please send order, or SAE for catalogue, to:

LEVEL 9 COMPUTING

Dept R, 229 Hughenden Road, High Wycombe, Bucks PCN

Please describe your Computer

FLASH SIMULATOR

'Hardware flash' is a term used to describe video chips that allow for flashing characters on the screen. This program, from F M O'Dwyer of Dublin, simulates a hardware flash using machine code to manipulate a hardware register in the Atari's ANTIC display processor. Lines 40 to 90 simply demonstrate the use of the system. Using this program, the programmer can create displays in 4 modes (not to be confused with Atari's graphics modes). The modes are:

- 0 Ordinary display.
- 1 Inverse letters flash on foreground colour.
- 2 Flashing cursor, inverse letters flash between inverse and normal.
- 3 Flashing cursor, inverse letters flash on background colour.

The modes are only effective in Graphics 0 or in a text window. In addition to the modes, the programmer

may control the rate of flash. The commands to tailor the system are as follows.

X=USR (FLASH) Initialises the system.
 POKE RATE,N Initialises the flash rate to N (0≤N≤255), smaller numbers give faster flash rates. POKEING RATE with 0 disables the system completely. To restart use X=USR(FLASH).
 POKE MODE,M Sets the mode to M (0 M 3). Other numbers produce exotic effects such as turning all the characters upside down.

Note: All commands should be followed by POKE 755,2 to ensure that the hardware flash doesn't get off on the wrong foot. In particular POKES to MODE

should be followed by this.

One thing you will notice about this program is that the Basic program is free to do other tasks while the characters flash, and that there is no noticeable degradation in speed of Basic. It is even possible to enter POKE MODE,2; POKE 755,2 in direct mode and have a flashing cursor while using INPUT in Basic programs. NEW does not disable the system but Reset does. It is also temporarily disabled during such operations as CSAVE, LPRINT, etc. Assembly language programmers should be aware that the program requires the use of the system timer at Hex 21A (system timer two).

Title: Hardware Flash Simulator
Machine: Atari
Language: Atari Basic
Application: Utility
Author: FMO'Dwyer

```
10 REM Hardware flash simulator by F.M.
O'Dwyer
20 FOR N=0 TO 3:READ A:POKE 1536+N,A:
NEXT N
30 FLASH=1536:MODE=1550:RATE=1548
40 GRAPHICS 0:PRINT "INVERSE=>this is a
test"
50 PRINT:PRINT "CURSOR=>"
60 X=USR (FLASH)
70 #OR SPEED=28 TO 1 STEP -1:POKE
RATE,SPEED:FOR N=1 TO 200:NEXT N:
NEXT SPEED:POKE RATE,10
80 FOR TYPE=3 TO 0 STEP -1:POKE
MODE,TYPE:POKE 755,2
90 FOR N=1 TO 200:NEXT N:NEXT TYPE
100 DATA 104,169,17,141,43,2,169,6,
141,41,2
110 DATA 169,20,141,26,2,96,72,173,
243,2
120 DATA 73,2,141,243,2,32,11,6,104,96
```

PRODUCTS FOR COMMODORE

SPEED UP ANY BASIC PROGRAM WITH OUR COMPILERS

Up to 40 times speed increase, reduced program size.

BASIC COMPILERS

- Petspeed Compiler for 4000/8000 series £125.00
 Integer Basic Compiler for 3000/4000/8000 series £75.00

CROSS-COMPILERS FOR BASIC

- Portspeed: Compiles source on 8000 series to run on CBM 64 £125.00
 X-64: Integer compiler compiling on 8000 series giving machine code executable on CBM 64 £125.00
 B-Port: Compiles source on 8000 series to run on 700/B-128 series £450.00
 X-700: Integer compiler compiling on 8000 series giving machine code executable on 700/B-128 £450.00

GIVE YOUR VIC OR 64 FULL IEEE AND RS232

Not a cartridge. Compatible with any software.

Interpod: Free-standing interface giving IEEE488 and RS232C capabilities to CBM64/VIC20 £99.95

SPECIAL OFFER

Order 5 or more Interpod and get a free Portspeed!

All prices are exclusive of VAT. There is also a small charge for post and packing. Dealer discounts are available on all products except the 700 cross-compilers.

Compilers are supplied ex-stock. Interpod supplied 7-days ex-stock.

COMMODORE SOFTWARE

Native compilers for the CBM 64 and the 700/B-128 are available only from Commodore.

Oxford Computer Systems (Software) Ltd.
 Hensington Road, Woodstock, Oxford OX7 1JR, England
 Telephone (0993) 812700 Telex 83147 Ref. OCSL

VISA ACCEPTED

DATABASICS

This six-page guide lists as many of the micros on the market for under £12,000 as possible. In Databasics you'll find all the specifications for the machines, add-ons and software necessary to make your buying decisions.

PCN keeps you up to date in three-week cycles, starting with hardware, then peripherals and finally software.

PRICE Specifications listed for each machine indicate what you get for the basic price quoted, which includes VAT.

PROCESSOR TYPE A microprocessor is the heart of the computer. The Z80 and 8502 are popular 8-bit chips. The 8088 and 68000 are common 16-bit chips. If a machine has an 8-bit and a 16-bit processor we have listed the 16-bit only. Cust. means custom-built.

SPEED IN MHZ Speed of the clock used to drive the microprocessor, measured in MegaHertz (million cycles per second).

STANDARD RAM Amount of main memory used on the system. The capacity is expressed in kilobytes.

MAX RAM normally at extra cost Amount of memory to which the system can be expanded.

MAX CHARACTERS columns × lines The number of characters that can be displayed across the screen and the number of lines down.

METHOD (at extra cost) This indicates the way the computer displays information. **M** on its own means that a monitor is included in the basic price.

Tv indicates that you can plug the computer into a television set (**M+**) indicates that the monitor costs extra. **LCD** = Liquid crystal display.

COLOUR CAPABILITY tells you whether the machine can give colour at the basic price quoted.

MAX DOT RESOLUTION gives the maximum number of points across the screen by the number of points down the screen that are available for graphics.

KEYBOARD This tells you the type of keyboard that comes with the machine. **W** = word processing, **C** = calculator and **T** = touch-sensitive.

No OF FUNCTION KEYS refers to the number of keys that can be used for different jobs by different programs.

NUMERIC PAD indicates whether the machine has a separate calculator-style group of number keys to enter data quickly.

INTERFACES BUILT-IN shows the number of standard connections built into the machine.

CASSETTE FACILITY gives a yes or no as to whether or not the machine can use a cassette to store data.

CAPACITY PER DISK AND DISK SIZE tells you how many disk drives come with the machine, and the amount of data in kilobytes (K) or megabytes (Mb) that can be stored on each drive. There are two sizes for disks, 5 1/4" or 8", and they can be floppy (F) or hard (H).

OPERATING SYSTEM gives the program that looks after the general running of a computer.

LANGUAGES INC is a column which lists the programming languages that come with the machine at the basic price.

OTHER LANGUAGES AVAILABLE indicates whether or not other programming languages are available for the machine.

DISTRIBUTOR To find which company distributes the machine refer to the distributor table from the code listed in this column. The table is at the end of the listings, and gives the distributor's name and telephone number.

All details given are the latest available. We ask distributors to let us know as soon as machine specifications change so Databasics can be kept right up to date. This guide has been meticulously researched and the information collected from individual distributors listed.

PRICE GUIDE

Sinclair ZX81	£40	Nascom 2	£327	Sanyo MBC 1000	£1,195	Transam Tuscan	£1,983	Xerox 820 Model II	£2,415	Zenith ZF-120-22	£2,978	Panasonic JDB00M	£3,795
Casio PB100	£50	Microtran 65	£389	Pied Piper	£1,226	NCR Decision Mate V	£1,983	Haywood 3000	£2,439	Monroe EC 8800	£2,990	Kemtron K3000	£3,795
TRS-80 PC4	£50	BBC Model B	£399	Positron 900	£1,259	Epson QX10	£1,995	LSM4	£2,472	Philips P3500	£3,000	DEC PC 350	£3,850
Aquarius	£30	Sharp MZ80A	£399	Tandy TRS-80 Model III	£1,299	IDS Datamachine II	£1,995	Canon CX-1	£2,500	Tanberg EC10	£3,000	Vector 4	£3,852
Laser 200	£70	Sinclair QL	£399	Cromemco C10	£1,350	Tandy TRS-80 Model II	£1,999	Sirius 1	£2,530	Archives 1	£3,003	Cifer Club	£3,904
Oric-1	£80	CompuLore Laureate	£400	Commodore 8096	£1,374	Kenilworth B3N	£2,012	Televideo Morrow M011	£2,500	Cromemco System 1	£3,025	IBMPCXT	£3,958
Sharp PC1251	£80	Advance A	£400	Sharp	£1,374	Galaxite Micro	£2,019	IO Tech Line	£2,539	Wang Professional	£3,076	Sage II	£4,019
Jupiter Ace	£90	Datasc Micro Controller	£431	Datasc PC8001	£1,375	Mistral	£2,059	HP 87XM	£2,571	DECPC-325	£3,080	Tandy TRS-80 Model 16	£4,199
Casio FX702P	£90	Powertan Cortex	£454	Pasca 640	£1,437	LSIMS	£2,064	Quantum 2000	£2,587	Direct 1000	£3,093	Hytech H4500	£4,310
Sinclair Spectrum	£99	Epson HX20	£472	NEC PC8000	£1,454	Haywood 9000 Composite	£2,064	Ajile	£2,599	Equator	£3,099	BMCOK 11F800, Model 20	£4,360
Commodore VIC-20	£100	Olivetti M10	£494	Signal 2	£1,483	SuperTan JR	£2,150	CP1100	£2,639	Clenco Table-Tops 925	£3,105	Televideo TS-80ZH	£4,533
Tandy TRS-80 Pocket 2	£130	Tandy TRS-80 Model 100	£499	Magnum	£1,489	Future Computers FX-20	£2,156	Seed System 19	£2,600	ITT 0030	£3,105	CountryComers C1000	£4,542
Atari 400	£149	NEC-8201A	£546	Televideo TS-800 Series	£1,495	CWPertan	£2,179	Enterprise 1000	£2,635	HP Series 200 Model 16A	£3,121	Micro Five 1000	£5,175
Nascom 3	£150	Nascom 3	£549	HP86A	£1,570	S/P Cortex	£2,179	Facit 6520	£2,645	Clier Series 1	£3,214	Fortune 32-16 System 2	£5,204
Computers Leisure	£160	Commodore 4016	£569	Osborne I	£1,581	Adler Alphatronc P2	£2,197	Olympia Boss Model A	£2,645	Samurai	£3,214	Zeus 4	£5,400
Alas 2000	£160	Mainsearch Machine 480Z	£583	Comant Communicator	£1,595	CountryComers C3000	£2,242	Kemtron K2000E	£2,645	Atlas 800-15	£3,214	Apple II	£7,653
Colour Gene	£168	DAI PC	£584	Signal 10025	£1,597	Rain Black Box 320S	£2,242	Adler Alphatronc P3	£2,696	Torch	£3,214	Apple Lisa	£7,653
Sharp PC1500	£169	Apple II	£776	Apple II	£1,610	Sanyo MBC 2000	£2,242	Eagle II	£2,702	Future FX30	£3,220		
Oric Atmos	£170	Commodore 8032	£776	Basis 108	£1,683	Sanyo MBC 2000	£2,242	Almarc 801	£2,708	Sord M223	£3,277		
Dragon 32	£174	Commodore 500	£797	Commodore Spr. Pet 9000	£1,719	Toshiba T-200	£2,242	DEC Rainbow 100	£2,714	Corona PC2	£3,276		
Texas CC40	£180	Apple IIe	£845	Gemini Galaxy 2	£1,719	Merlin M2215	£2,242	ICL PC Model 10	£2,758	Kontrom RS180	£3,306		
Tandy TRS80 colour	£180	Tandy Model 4	£861	ACT Actix	£1,719	Macintosh	£1,800	Milbank SX10	£2,754	Kaypro 10	£2,995		
Mattel Intellivision	£190	Sanyo MBC 550	£862	Macintosh	£1,800	Cam PC	£1,840	Sirius I	£2,754	Columbia PC 1600-1	£3,392		
Electron	£199	HP 75C	£967	Microsolution Brit. Genius	£1,850	TMK 332	£1,850	Victor 9000	£2,754	Digico Prince	£3,392		
Computers Lynx	£225	Sharp MZ80B	£900	Globe 101	£1,850	Sanyo MBC 1250	£2,294	North Star Advantage	£2,786	OEM Orion	£3,392		
Dragon 64	£225	Franklin Ace	£914	Grundy 8200	£1,850	Casu Mini C2	£2,300	Apple II	£2,780	Barcellos AMT 100	£3,450		
Commodore 64	£229	Mupid 320 GB	£978	Genie II	£1,897	Seed System I	£2,300	Sanyo MBC 4050	£2,817	Kalamazoo 1050	£3,478		
Sharp MZ700	£250	Husky Hunter	£983	Toshiba T-100	£1,900	Sharp PC3201	£2,353	Bonsai SM 4000	£2,817	Televideo TS 803H	£3,478		
Atari 800XL	£250	Wren	£1,000	IBM PC	£1,933	LSI Octopus	£2,353	Logica VTS Vitesse	£2,863	Digital Microsystems 3	£3,576		
New Brain A	£269	Commodore 710	£1,144	Sord M23	£1,932	Silver Screen	£2,360	Decision-1 Computer O11	£2,869	Corvus Concept	£3,594		
Memo-tech MTX500	£275	Microdecision	£1,144	Kaypro II	£1,949	HP 85	£2,362	Olivetti M20	£2,869	Televideo TS 1602-C	£3,784		
Genie II	£299	Duel II	£1,144	Krypton 800 range	£1,949	Sord M23P	£2,369	DMS Fox	£2,875	Add Multi-vision	£3,795		
Atari 800	£300	Tulp 1	£1,150	Kenilworth 833	£1,953	TI Pro Computer	£2,386	Eagle III	£2,950	Clenco Pronto	£3,795		
Spectravideo 328	£302	Fujitsu FM8	£1,150	Televideo Teleporta 1	£1,955								

ABBREVIATIONS

Ap: APL
As: Assembly
Ba: Basic
Co: Cobot
Cm: Comal
Fr: Forth
Pa: Pascal

Make and model

HARDWARE

Make and model	Price inc VAT	Processor type	Speed in MHz	Standard RAM	Max RAM - normally in 16Kb cost	Display		Graphics	Keyboard	Interfaces built-in					Storage	Operating system	Language inc	Other languages available	Distributor	Comments
						Max characters columns x lines	Method (if text cost)			Colour capability	Max dot resolution	Type of keyboard	No. of function keys	No. numeric pad						
ACT Apricot	£1,719	8086A	5	256K	768K	80x25	LCD	800x400	W	8	1	1	2	2x315K5¼F	MS DOS	Ba	●	A7	PCN issue 37	
Adds Multivision	£3,795	8085A	5	64K	256K	80x25	M	640x240	W	28	1	1		1x350K5¼F	CP/M2.2, Muon	Ba	●	A2	Multi user system	
Adler Alphatronic P2	£2,197	8085A	3	48K	64K	80x24	M		W	6	2	1	3	2x320K5¼F	CP/M	Ba	●	T1	£327 buys extra storage	
Adler Alphatronic P3	£2,696	8085A	3	64K		80x24	M		W	6	2	1	3	2x790K5¼F	CP/M	Ba	●	T1	16 bit option-promised	
Ajile	£400	8086	4.7	128K	640K	80x24	TV (M+)	640x200	W	10	1	2	●	2x360K 5¼F	MS DOS	Ba	●	A10	Expandable for business use	
Advance A	£2,599	8088	4	256K		80x25	M	640x250	W	10	1	1	2	2x320K5¼F	MS DOS	BaAs	●	A9	PCN issue 13	
Almarc 801	£2,708	Z80	4	64K	512K	80x25	(M+)		W	2	1	11		2x800K5¼F	CP/M	Ba	●	A4	8-bit range goes to 20Mb	
Aquarius	£68	Z80A	4	4K	52K	40x24	TV	320x192	C				1		Cassette	Ba	●	M7	PCN issue 7	
Altos 800/15	£5,663	Z80	4	192K	208K	80x24	M		W	8	1			1x450K5¼F	MP/M	Ba	●	L1	Multi user business machine	
APL Signet	£1,610	Z80A	4	64K		80x25	Tv(M+)*				2			2x188K5¼F	APL, CP/M	Ap	●	M1	*APL terminal recommended	
Apple II	£776	6502	1	48K	128K	40x24	Tv(M+)	256x192	W				8		CP/M, DOS 3.3, UCSD-P	Ba	●	A8	Plenty of software and extras	
Apple IIe	£945	6502	1	64K	128K	80x24	(M+)	256x192	W				1	8	DOS	Ba	●	A8	Updated Apple II	
Apple III	£2,780	6502	2	128K	256K	80x24	(M+)	560x192	W	●	1	4		1x140K5¼F	SOS, DOS	Ba	●	A8	Will emulate Apple II	
Apple Lisa	£9,775	68000	8	1Mb		120x30	M	792x360	W	●	2	1	3	2x860K5¼F	Lisa	Ba	●	A8	PCN issue 1	
Archives I	£3,003	Z80	4	64K		80x25	M	240x100	W	23	2	1	5	2x386K5¼F	CP/M	Ba	●	S1	Standard CP/M + graphics	
Atari 600XL	£160	6502C	1.79	16K	64K	40x24	(M+)+Tv	320x192	W	5				1x127K5¼F	DOS 2	Ba	●	A5	Dos 3 available 1984	
Atari 800XL	£250	6502C	1.79	64K		40x24	(M+)+TvM	320x192	W	5				1x127K5¼F	DOS 2	Ba	●	A5	256 columns, 128 at any one time	
Barcellos AMT 100	£3,450	Z80A	4	64K	256K	80x24	TvM		W	8	1	1	2	3	2x500K8F	CP/M	BaCo	●	B1	Up to four users
Basis 108	£1,683	6502	1	64K	126K	80x24	TvM	820x168	W	15	1	1	6			BaAs	●	C12	Apple bus, Z80, 80 columns	
BBC Micro Model B	£399	6502	2	32K		80x30	Tv(M+)	640x256	W	10		1	5	3		MOS	BaAs	●	A1	PCN issue 3
Bonsai SM 3000	£2,294	Z80	2	64K		80x24	M	80x24	W	14	1	1		2x350K5¼F	CP/M, MS-DOS	Ba	●	B2	CP/M business machine	
Bonsai SM 4000	£2,842	8088	5	128K	256K	80x24	M		W	14	1	1			CP/M, MP/M, MS-DOS	Ba	●	B2	Z80 for 8 bit software	
Britannia Baby	£2,657	8085	6.14	64K		80x25	Tv(M+)	80x25	W	11	2	1		2x500K5¼F	CP/M	AsBaCo	●	B3	Both language included	
British Micro Mini 803	£1,490	280A	4	64K		80x25	(M+)	512x256	W	17	1	1	1	2x400K5¼F	OS/M	Ba	●	B4	This is CP/M compatible	
CAL PC	£2,294	8088	5	128K	256K	80x25	TvM	256x512	W	●	2	1	5	2x400K5¼F	CP/M	Ba	●	C3	Also Z80B Processor	
C-Base 64A	£401	6502	1	64K	192K	40x24	Tv(M+)		W	51			8		CP/M, DOS 3.3, UCSD-P	Ba	●	W3	Apple II compatible	
Calltex Micro	£2,019	Z80A	4	64K	256K	80x24	TvM		W	36	1	1	3	2x400K5¼F	CP/M	Ba	●	C3	Range of software included	
Computers Leisure	£159.95	Z80A	4	48K	192K	40x24	Tv(M+)	248x256	W	1	1	1				Ba	●	C5	Mail order only	
Computers Laureate	£399.95	Z80A	4	128K	192K	40x24	Tv(M+)	248x256	W	1	1	1		2x250K5¼F	CP/M	Ba	●	C5	CP/M system for £700	
Canon AS100	£2,633	8088	4	128K	512K	80x25	M	640x400	W	12	●	1	4	2x640K5¼F		Ba	●	C4	Choice of CP/M86 or MS-DOS	
Casio FX 702P	£90	Cust.		2K		20x1	LCD		C	●					Cassette	Ba	●	C6	Pocket computer	
Casio PB100	£50	Cust.	0.7K	1.7K	60x1	LCD			C	●					Cassette	Ba	●	C6	Business pocket computer	
Casu Mini C Mark 2	£2,300	Z80A	4	64K							4	1	6	2x1Mb8F		Ba	●	C7	*Choose your own terminal	
Cifer Series 1	£3,214	Z80	4	128K	320K	132x32	TvM		W	40	3	1		2x800K5¼F	CP/M	Ba	●	C17	Other models available	
Clenio Table-Top 925	£3,105	Z80A	4	64K	128K	80x25	M		W	11	2	2		2x600K8F	CP/M	Ba	●	C8	Watch out for the weight	
Columbia PC1600-1	£3,392	8088	4.77	128K	1Mb	80x24	M		W	10	2	1	8	2x320K5¼F	CP/M, MS DOS	Ba	●	I1	An IBM lookalike	
Commodore VIC 20	£100	6502	1	5K	32K	22x23	Tv(M+)	176x184	W	8			3	1	Commodore DOS	Ba	●	C9	Very popular home micro	
Commodore 64	£229	6510	1	64K		40x25	Tv(M+)	320x200	W	8		1	4	●	Commodore DOS	Ba	●	C9	PCN issue 24	
Commodore 700	£1,144	6509	2	128K	256K	80x25	TvM		W	10	1	1	2	1	Commodore DOS	Ba	●	C9	PCN issue 5	
Commodore 8032	£776	6502	1	32K	96K	80x25	TvM	160x50	W	●		1	4	●	Commodore DOS	Ba	●	C9	The 80-column PET	
Commodore SX-64	£895	6510	1	64K		40x25	M	320x200	W	8		1	4		CP/M	Ba	●	C9	Portable Commodore 64.	
Commodore Super Pet 9000	£1,719	6502	2	96K		80x25	TvM		W	●	1	1	1	2	Cassette, PETDOS	Ba	●	C9	Top of the range	
CompuStar	£5,837	Z80A	4	64K		80x25	M		W	●	2			1x10Mb8H+1x350K5¼F	CP/M	Ba	●	I10	Networking system	
Comart Communicator CP100	£1,595	Z80	4	64K	512K	80x24	M		W	●	2	1	10	2x390K5¼F	CP/M	Ba	●	C13	Business CP/M micro	
Corona PC2	£3,076	8088	5	256K	512K	80x25	M	640x325	W	10	●	1	4	2x320K5¼F	MS DOS	Ba	●	M9	Price includes twin disk drive	
Corvus Concept	£3,594	68000	8	256K	1Mb	120x60	M	720x560	W	10	●	2	1	4		Merlin	Pa	●	K1	A4 shaped screen

Make and model	Price inc VAT	Processor type	Speed in MHz	Standard RAM	Max RAM - normally at extra cost	Display		Graphics	Keyboard	Interfaces built-in				Storage	Operating system	Languages inc	Other languages available	Distributor	Comments
						Max characters columns x lines	Method (if extra cost)	Colour capability	Max dot resolution	Type of keyboard	No. of function keys	Numeric pad	No. of RS232						

HARDWARE

CP1100	£2,639	8086	6	128K	1Mb		(M+)*	●	450x735	W	20	●	2	1	7	2x390K5¼F	CP/M 86	●	C13	Choose your own terminal		
Cromemco System 1	£3,025	Z80	4	64K		80x24	(M+)	●	450x735	W	20	●	1		8	2x390K5¼F	CDOS, Crom	●	C13	Upgrades available		
Cromemco C10	£1,350	Z80	4	64K		80x25	M		80x25	W	20	●	2	1		1x390K5¼F	CP/M	Ba	●	C18	Low cost CP/M machine	
C-WP Cortez	£2,179	Z80	4	64K		80x25	M	●	600x240	W	10	●	1	1		2x360K5¼F	CP/M	Ba	●	C20	Z80 plus 6502	
DAI PC	£684	8080	2	48K		60x24	Tv(M+)	●	255x335	W	1				●		Cassette	Ba	D9	Optional maths chip		
Datasc Micro Controller	£431	Z80	2	16K		40x24	Tv(M+)	●	80x60	W	1		1	1	●			Ba	D1	Mainly used in labs		
DEC Rainbow 100	£2,714	8088	N/A	64K	192K	132x24	M	●	960x240	W	20	●	2		3	2x400K5¼F	CP/M	●	D2	Versatile business machine		
Decision-1 Computer MDC-011	£2,869	Z80A	4	64K	192K		(M+)*						3	1	1	2x400K5¼F	CP/M	Ba	●	I2	'Buy your own terminal	
Dragon 32	£174	6809E	1	32K	64K	32x16	Tv(M+)	●	256x192	W			1	4	1	●	Cassette	Ba	D6	Tandy colour lookalike		
Dragon 64	£225	M6809	0.89	64K		32x16	Tv(M+)	●	256x192	W			2	4		1x175K5¼F	OS9	Ba	●	D	PCN issue 39	
Duet 16	£1,144	8086	8	128K	512K	840x400	(M+)	●	640x400	W	12	●	2	1	4	1x720K5¼F	MS, DOS, CP/M	Ba 86	●	L7	Portable business	
Eagle II	£2,702	Z80A	4	64K		80x24	M	●	80x24	W	●	2	1	1		2x500K5¼F	CP/M	Ba	●	M3	Upgrades available	
Electron	£199	6502	2	32K		80x32	Tv(M+)	●	640x256	W	10				●		MOS	BaAs	●	A1	Excellent beginners' machine	
Epson HX20	£472	6301	1	16K	32K	20x4	LCD		120x32	W	13	●	2		2	●	Cassette	Ba	E2	Powerful portable		
Epson QX10	£1,995	Z80	4	192K	256K	80x25	M	●	640x400	W	18	●	1	1	5	2x320K5¼F	CP/M	Ba	●	E2	Expansion required for Valdocs	
Fortune 32-16 System 2	£5,204	68000	6	256K	1Mb	80x24	M	●	1024x1024	W	16	●	1		20	2x800K5¼F	Unix	●	C3	Genuine 16-bit		
Franklin Ace 1000	£914	6502	1	64K	128K	40x24	M, Tv	●	256x192	W	●	1	1	4	1	●	opt CP/M	Ba	●	I5	Apple IIe compatible	
Fujitsu FM8	£1,150	6809	1	64K		80x25	(M+)	●	640x200	W	10	●	1	1	4	1	●	Flex	Ba	S2	Good for business graphics	
Future Computers FX-20	£2,156	8088	8	128K	1Mb	80x25	M	●	800x400	W	20	●	2	2		2x800K5¼F	CP/M 86, MS-DOS	●	E1	Business micro, runs CP/M		
Genie II	£299	Z80	1.7	16K	48K	64x16	Tv(M+)	●	128x48	W	4	●	1		1	●	Cassette	Ba	●	L2	Speeded-up Genie I	
Genie III	£1,897	Z80A	3.2	64K		80x24	M	●	160x72	W	8	●	1	1	1	3	2x700K5¼F	New DOS	Ba	●	L2	CP/M costs extra
Colour Genie	£168	Z80	2.2	32K		40x24	Tv(M+)	●	160x96	W	8	●	1	1	2	1	●	Cassette	Ba	L2	Home games machine	
Germini Galaxy 2	£1,719	Z80	4	64K	512K	80x25	M	●	160x75	W	10	●	1	1	5	●	2x400K5¼F	CP/M	●	G1	Low cost British system	
Globe 101	£1,850	8085	3	64K		80x24	M	●	160x75	W	20	●	3			2x325K5¼F	CP/M	●	G4	Wordstar plus Mail Merge inc.		
Grundys 8200	£1,850	Z80	4	64K	256K	80x24	M	●	160x70	W	10	●	1	1		2x390K5¼F	CP/M	●	C19	Software included		
Haywood 9000 Composite	£2,064	Z80A	4	64K	192K	80x25	M	●	64x255	W	34	●	2		8	2x320K5¼F	CP/M	As	●	H1	Designed for network	
Hitachi PC1	£2,985	8088	5	320K	576K	80x25	M	●	640x200	W	10	●	1	1	2	5	2x320K5¼F	MS DOS	Ba, As	●	H6	Will be Pro-Tested, Issue 44
HP 75C	£883	Cust.	N/A	16K	24K	32x1	(M+)			C					1	4	●	1.3K card reader	HP	Ba	H2	Calculator/computer
HP 86A	£1,570	Cust.	N/A	64K	512K	80x24	M	●	544x240	W	1	●	1	2	4			HP	Ba	●	H2	CP/M optional
HP Series 100, 120	£2,362	Z80A	3.68	64K		80x24	M	●	80x24	W	8	●	2	1				CP/M	Ba	●	H2	Top end HP business system
HP Series 200 Model 16A	£3,212	68000	8	128K	750K	80x25	M	●		W	5	●	1	1	2			HP	Ba	●	H2	Genuine 16-bit
Husky Hunter	£997	NSC800	4	80K	208K	40x8	LCD		240x64	C	8	●	1					CP/M	Ba	●	D10	Waterproof, with metal case
Hyperion	£3,100	8088	4.7	256K		80x25	M	●	320x200	W	10	●	1	1	1	1x320K5¼F	MS, DOS, CP/M 86	BaAs	●	G5	Same as Ajile	
IBM PC	£1,914	8088	4.7	64K	576K	80x25	(M+)	●	640x200	W	10	●	1	1	5	1x360K5¼F	MS-DOS	Ba	●	I9	Slow but reliable	
IBM PCXT	£3,958	8088	4.77	128K	640K	80x25	(M+)	●	350x720	W	12	●			8	1x10Mb5¼H	DOS 2	Ba	●	I9	8087 co-processor possible	
ICL PC Model 10	£2,754	8085	3	64K	256K	80x24	Tv(M+)	●		W	11	●	2		8	2x700K5¼F	CP/M	Ba	●	I4	Bottom of range	
ICL PC Model 15	£2,702	8085A	5	64K	512K	80x25	M	●		W	●	8				1x13.3Mb5¼H	CP/M, MP/M	Ba	●	I4	Suitable for small business	
IDS Datamachine	£1,995	Z80	4	64K	1Mb		Tv(M+)						2		15	2x400K5¼F	CP/M	Ba	●	I8	'Depends on terminal	
IO Tech Iona	£2,539	Z80	4	69K	960K	80x24	M	●	160x75	W	12	●	1	1	8	●	2x400K5¼F	CP/M	Ba	●	I5	Good colour versatility
Intellivision + micro adaptor	£189.90	CP1610	2.4	5K		20x12	Tv	●	160x96	C					1	●		Cassette	Ba	M7	Native adaptor is £89.95	
Jupiter Ace	£90	Z80	3.25	3K	51K	32x24	Tv(M+)	●	64x46	C	●				1	●			Fr	J1	Computer distributor	
Kaypro II	£1,949	Z80	4	64K		80x24	M	●		W	●	1	1			2x200K5¼F	CP/M	Ba	●	C15	PCN issue 35	
Kaypro 10	£2,595	Z80A	4	64K		80x24	M	●	100x160	W	●	1		2		1x10Mb5¼H	CP/M	Ba	●	C15	PCN issue 35	
Kemtron K200E	£2,242	Z80	4	64K		80x24	(M+)	●	80x24	W	2	●	1	1	11	1x300K5¼F	CP/M	●	K4	Scientific Keyboard		

Kenilworth 83G	£1,953	Z80A	4	64K	80x25	TvM		160x75	W	10	●	1	1	5	2x350K5/4F	CP/M		●	K5	British portable	
Krypton 200 range	£1,949	Z80A	4	64K	256K	80x24	M	80x24	W	13	●	2	1	8	2x386K5/4F	CP/M		●	T8	Fully definable characters	
Laser 800	£70	Z80A	3.6	4K	64K	32x16	TV	32x16	C	●				1				Ba	C14	Cheap colour computer	
LSI M3	£2,064	Z80	2.5	64K	80x24	M	80x24	W	31	●	1	1			2x200K5/4F	CP/M		●	L3	Big, British and CP/M	
LSI Octopus	£2,353	Z808	8088	6.8	128K	132x29	M	720x340	W	32	●	2	1	4	2x400K5/4F	CP/M 86/80 Plus	Ba	●	L3	20Mb colour with 256K is £5,129	
Logica VTS Vitesse	£2,863	8086	5	64K	256K	80x24	M	640x288	W	12	●	1	1	1	2x1M5/4F	CP/M, MS-DOS	Ba	●	L4	High-res colour graphics	
Macintosh	£1,800	68000	4	128K	3Mb	N/A	M	512x342	W	●					1x400K3/4F	MAC		●	A8	PCN Issue 46 Brilliant graphics	
Magnum	£1,489	Z80	4	64K	80x25	M			W	●					2x400K5/4F	CP/M		●	I6	Inexpensive CP/M machine	
Memotech MTX 500	£275	Z80A	4	32K	512K	40x24	TV	256x192	W	16	●	2			2x500K5/4F	MOS	Ba, Noddy	●	M10	Noddy is Memotech's own lang.	
Merlin M2215	£2,742	8085	5	64K	24x80	M			W	22	●	2		2	2x780K5/4F	CP/M		●	B7	Business computer	
Microdecision	£1,144	Z80	4	64K	80x24	(M+)			W	●					1x200K5/4F	CP/M	Ba, Pilot	●	M9	*Terminal extra	
Microsolution British Genius	£1,840	Z80	4	64K	80x24	TvM	80x24		W	21	●	1	1		2x160K5/4F	CP/M		●	M4	Genius' by nature?	
Microtan 65	£389	6502	1	8K	48K	25x64	(TvM++)		W	●						Tanbug	Ba	●	M8	PCN issue 26	
Milbank SX10	£2,754	Z80A	4	65K	256K	80x25	M	80x25	W	10	●	2		1	2x350K5/4F	CP/M	As	●	M5	Scientific applications	
Minstrel	£2,059	Z80	4	64K	352K				W	●					2x400K5/4F	CP/M opt		●	H4	Choose your terminal	
Mupid 320-GB	£978	Z80A	4	64K	128K	40x24	Tv(M+)	320x240	W	55	●	1	2	1		CP/M+	BaAs	●	L6	PCN issue 22	
Nascom 23	£327	Z80A	4	2K	64K	16x48	Tv(M+)	48x96	W	●						NAS, SYS	BaAs	●	P5	Old reliable	
NCR Decision Mate V	£1,983	Z80A	4	64K	512K	24x80	M	640x400	W	20	●			7	2x320K5/4F	CP/M 80	As	●	N3	PCN issue 8	
NEC PC8000	£1,454	Z80	4	32K	64K	80x25	M	160x100	W	10	●	2	1		2x300K5/4F	CP/M, NEC, DOS	Ba	●	N1	Superb colour graphics	
NEC PC8001	£1,375	Z80A	4	64K	80x24	M	100x200		W	10	●				2x144K5/4F	CP/M	Ba	●	N1	Price includes twin disk drive	
NEC-8201 A	£546	80C85	2.4	16K	64K	40x8	LCD	240x62	W	5	1	1	2	1			Ba	●	N1	Portable PC, PCN issue 45	
Newbrain A	£269	Z80A	4	32K	512K	80x30	Tv(M+)	640x220	C	●						Cassette	Ba	●	G3	A lot of promise	
Olivetti M20	£2,869	Z8000	3	160K	512K	80x25	M	512x256	W	●					2x320K5/4F	PCOS	Ba	●	B6	Real 16-bitter	
Olivetti M10	£494.50	80C85	2.4	8K	24K	40x8	LCD	240x64	W	12	●	1	1	2	1			Ba	●	B6	Portable PC, 24K version £644
Oric 1	£80	6502A	1	16K	48K	40x28	Tv(M++)	240x200	C	●							Cassette	Ba	●	O2	4-colour printer opt
Oric Atmos	£170	6502A	1	48K	64K	28x40	Tv(M++)	200x240	W	1	1	2	2	●	1x320K3F	Extended Microsoft Basic	Ba	●	O2	PCN issue 49 Improved ROM	
Osborne 1	£1,581	Z80	4	64K	104x24	M	104x24		W	10	●	1	1		2x185K5/4F	CP/M	Ba	●	O3	Portable, includes software	
Pasca 640	£1,437	Z80A	4	64K	80x24	M	80x24		W	●					2x250K8F	CP/M		●	W1	Regular CP/M micro	
Pied Piper	£1,226	Z80A	4	64K	80x24	Tv(M++)			W	36	●			1	1x780K5/4F	CP/M		●	S11	PCN issue 4	
Philips P3500	£3,000	Z80A	4	64K	320K	80x25	M		W	11	●	2		1	2x0.6Mb5/4F	Turbo-DOS	Co	●	P3	Fast O/S as standard	
Positron 900	£1,259	6809	1	64K	256K		(M+)		W	●						O/S 9	Ba	●	P4	*You choose your terminal	
Powertran Cortex	£454	9995	12	64K	1Mb	40x24	Tv(M++)	256x192	W	12	●	1					BaAs	●	M2	Mainly sold as £340 kit	
Quantum 2000	£2,587	Z80A	4	64K	192K	80x25	M	160x75	W	18	●	1	1	5	3x860K5/4F	CP/M		●	Q1	Mono, low-res graphics	
Rair Black Box Model 3/20S	£2,242	8085	5	64K	256K	80x24	(M+)		W	●				8	2x1M5/4F	CP/M	Ba	●	R1	*VDU extra; many versions	
Research Machines 380Z	£2,147	Z80A	4	32K	56K	40x24	Tv(M++)		W	●				4	2x144K5/4F	CP/M	Ba	●	R3	Widely used in schools	
Research Machines Link 480Z	£650	Z80A	4	32K	256K	40x24	Tv(M++)		W	4	●	2	1	2			Cassette	Ba	●	R3	CP/Net version available
Sage II	£4,019	68000	8	128K	512K		(M+)		W	●					2x640K5/4F	UCSD-P System	BaAsPafn	●	T10	*Terminal extra	
Samurai	£2,754	8086	4.6	128K	768K	80x25	M	720x400	W	12	●	3	1	3	2x1.2Mb8F	MS DOS, CP/M 86		●	M6	High-res colour graphics	
Sanyo MBC 1000	£1,195	Z80A	4	64K	80x25	M	80x25		W	17	●	1			1x320K5/4F	CP/M	Ba	●	L1	Standard CP/M model	
Sanyo MBC 1250	£2,294	Z80	4	64K	80x40	M	640x400		W	●					2x640K5/4F	CP/M	Ba	●	L1	High-res graphics	
Sanyo MBC 2000	£2,242	8085A	5	64K	80x24	M	80x24		W	24	●	2	1	2	2x328K5/4F	CP/M	Ba	●	L1	Big disk model costs £3,622	
Sanyo MBC 550	£862	8088	4	128K	256K	80x25	(M+)	640x200	W	10	●	1	1	16	1x160K5/4F	MSDOS1.25	Ba	●	S12	PCN issue 50	
Seed System 19	£2,600	6809	2	48K	1Mb	80x24	M		W	3	●	2		8	2x160K5/4F	O/S-9		●	S3	Latest from Seed	
Sharp MZ80A	£347	Z80	2	48K	40x25	M	80x50		W	●						Sharp Basic	Ba	●	S4	CP/M facility extra	
Sharp MZ80B	£900	Z80A	4	64K	80x25	M	320x200		C	10	●					Sharp Basic	Ba	●	S4	Unusual keyboard	
Sharp MZ700	£250	Z80A	4	64K	40x25	Tv(M++)	●	80x50	W	5	●	1	2	1		Sharp	Ba	●	S4	PCN issue 27	
Sharp PC1251	£79.95	Cust.	.58	4.2K	LCD	24x1	C	18	●							Sharp Basic	Ba	●	S4	Pocket computer	
Sharp PC1500	£169	Cust.	1.3	3.5K	11.5K	26x1	LCD	156x7	C	6	●	1	1	2			Cassette	Ba	●	S4	Optional 4-pen plotter
Sharp PC3201	£2,300	Z80A	2.6	64K	112K	80x25	M	160x50	W	10	●			5	2x500K5/4F	Sharp Basic	Ba	●	S4	Powerful Sharp Basic	
Sharp PC5000	£1,374	8088	4	128K	256K	80x8	LCD	640x80	W	15	●	1	3	2	2x320K5/4F	MSDOS	Ba	●	S4	PCN Issue 51	
Signet 2	£1,483	Z80	4	64K	80x24	(M+)	●	512x256	W	18	●	2			2x200K5/4F	CP/M		●	S9	Multi-user system	
Silver Screen	£2,357	Z80A	4	64K	80x24	M			W	16	●				2x312K5/4F	CP/M		●	S13	Keyboard costs £250 extra	
Sinclair ZX81	£40	Z80A	1K	16K	32x24	Tv	64x44	C	●							Cassette	Ba	●	S5	Sold a million	
Sinclair Spectrum	£99	Z80A	3.5	16K	48K	32x24	Tv	256x192	C	●						Cassette	Ba	●	S5	PCN issue 14	
Sinclair QL	£399	68000	7.5	128K	640K	80x25	(M+)	TV	●	512x256	W	5	2	4	2x100K Microdrives	QDOS	Sinclair SB	●	S5	Micro that can be networked	
Sirius I	£2,525	8088	5	128K	896K	80x25	M	800x400	W	7	●	2	1	4	2x600K5/4F	CP/M 86, MS-DOS	Ba	●	A7	IBM style	

DIAL-TEXT 50

TYPEWRITER TO TYPEWRITER COMMUNICATION



DIAL-TEXT 50 is a simple to use electronic typewriter (ET) to electronic typewriter communications device. It is plug compatible with the OCTET 121 and HERMIT 21 interfaces designed by Duplex and can also be used with any RS232 device such as a microcomputer or printer.

Simple to install

Installation is easy and no special wiring is required - communication is achieved by simple cable connection or through any acoustic coupler. For instance, the user can simply place the DIAL-TEXT 50 unit and acoustic coupler between an OCTET 121 or HERMIT 21 typewriter and a standard telephone handset for transmission of ERROR FREE letters and documents (or telex messages) to a remote DIAL-TEXT 50 unit and acoustic coupler, nationally or internationally.

Typical application

The DIAL-TEXT 50 unit is ideal for remote offices which would like to use the main office telex facilities. Text can be prepared at the remote office and transmitted to the main office to cut telex paper tape for forward transmission. Incoming telexes for the remote office would receive messages in the reverse manner.

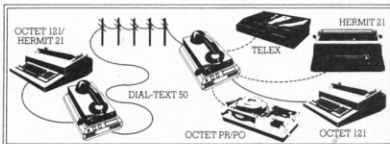
Special Dial-Text 50 features & benefits

1. 16,000 CHARACTER MEMORY. Retains contents when power is off.

2. ERROR free messages through use of automatic ERROR DETECTION and CORRECTION facility.
3. TRANSMISSION SPEED approx. 5 times faster than a standard telex machine, providing the FULL range of typewriter characters and symbols upper-case and lower-case.
4. MENU DRIVEN through a 16 character display.
5. OPERATORS CONTROL PANEL for message viewing and deletion.
6. INCOMING/OUTGOING messages automatically differentiated by special character.

7. ABILITY TO PRINT (retrieve) messages from the DIAL-TEXT 50 unit at any time.
8. ABILITY TO STORE messages onto a standard tape cassette unit. (Ask for the OCTET or HERMIT TI unit).
9. CONVENIENT CONFIDENTIAL MESSAGE HANDLING we use own secretary as operator.
10. PORTABLE lightweight stand-alone unit with own 240v power supply which can be shared within the office.
11. DIAL-TEXT 50 allows local text processing without the need to transmit messages.
12. COST of transmission limited to normal telephone rates.
13. MESSAGE SCRAMBLER facility (optional).

SUSS



BOX

The DUPLIX SUSS-BOX and DUPLIX SUSS-ADAPTOR have been designed to enable the less skilled computer user to have a better understanding of the correct working connection between a computer and a peripheral, such as a printer. This is achieved by using the commonly used signals (wires) of the RS232C serial data cable specification, a matrix-block and special connector pins. By inserting the connector pins into the SUSS-BOX's matrix-block at the axis of two incoming signals the user can quickly establish a firm connection. The signals are routed into the SUSS-Box by two 25 way D type connectors, 1 x female, 1 x male. The SUSS-BOX also provides a lamp for each signal to show its condition when connected in line, ie High or Low.

SUSS ADAPTOR

When the user has achieved the correct Pin out between a micro computer and a printer the DUPLIX SUSS ADAPTOR should be used as a permanent means of connection. This is done by transposing the correct matrix block pin-layout already established with the SUSS BOX onto the matrix block of the SUSS ADAPTOR and then installing the SUSS ADAPTOR in between the computer and printer.

SUSS BOOK (2nd edition)

If the user specifically wishes to connect a microcomputer to the OCTET or HERMIT typewriter/printer then refer to DUPLIX's SUSS BOOK for details on various microcomputer cable Pin outs.



£29.95
+ £1.00 p&p
- VAT

Full details from  sole suppliers:

£6.95
+ £0.65
p&p

DUPLIX

Communications

The Interface People

South — 52 High Street, Stock, Essex CM4 9BW, Tel: 0277 841011.
Midlands North — 2 Leire Lane, Duntun Bassett, Nr Lutterworth, Leicestershire LE17 5JP.
Tel: 0455 284398.

Make and model	Price inc VAT	Processor type	Speed in MHz	Standard RAM	Min. RAM - normally for hard cost	Max. external storage in MBs	Display		Graphics	Keyboard	Interfaces built-in	Storage	Operating system	Languages inc	Other languages available	Distributor	Comments
							Method (if text cost)	Colour capability									

HARDWARE																						
Sord M5	£150	Z80A	4	4K	16K	40x24	Tv(M+)	●	256x196	C	1	2	3	●	Cassette	Ba	S6	PCN issue 12				
Sord M23	£1,932	Z80A	4	128K	80x25	M	●	80x25	W	14	2	1	2	3	●	2x330K5¼F	Sord O/S, SB80	BaPips	●	S6	CP/M compatible	
Spectravideo 328	£302	Z80A	3.6	80K	144K	40x24	Tv(M+)	●	256x192	W	10	●	3	1	1	●	2x256K5¼F	MSX	Ba	●	C15	PCN issue 48
Superbrain JR	£2,127	Z80A	4	64K	80x24	M	●	560x240	W	●	2	1	1	●	●	2x160K5¼F	CP/M	Ba	●	I10	Bigger models available	
Tandy TRS-80 Model III	£1,299	Z80A	2	48K	64x16	M	●	128x48	W	●	1	1	1	●	●	2x184K5¼F	TRS-DOS	Ba	●	T4	Related TRS 80	
Tandy TRS-80 Colour Computer	£180	6809E	1	16K	32K	32x16	Tv	●	256x192	W	1	●	●	●	●	2x184K5¼F	Cassette	Ba	●	T4	Related to Dragon 32	
Tandy TRS-80 PC4	£50	Cust.	N/A	1/8K	1 1/8K	12x1	LCD	●	12x1	C	9	●	1	1	1	●	Cassette	Ba	●	T4	Low-cost pocket computer	
Tandy Model 4	£861	Z80A	2	16K	128K	80x24	M	●	80x24	W	10	1	1	●	●	1x187K5¼F	TRS DOS	Ba	●	T4	Floppies versions available	
Tandy Model 100	£499	8085	2.4	8K	32K	40x8	LCD	●	240x62	W	1	1	1	●	●	●	●	Ba	●	T4	Software built in	
Tandy TRS-80 PC2	£130	Z80A	1.3	2.6K	16K	26x1	LCD	●	156x7	C	15	●	●	●	●	●	Cassette	Ba	●	T4	Floppies versions available	
Televideo TS-800 Series	£1,495	Z80A	4	64K	80x24	M	●	80x24	W	6	15	2	1	1	●	●	CP/M	Ba	●	C11	Plotted CP/M machine	
TI Professional Computer	£2,386	8088	5	64K	256K	80x25	M	●	80x25	W	12	●	1	1	●	●	1x320K5¼F	●	Ba	●	T5	PCN issue 3
Texas CC40	£180	Cust.	6K	18K	31x1	LCD	31x1	C	4	●	●	●	●	●	●	●	●	Ba	●	T5	Cartridge software available	
TMK 332	£2,242	8085A	5	64K	80x24	M	●	190x96	W	22	●	2	1	●	●	2x320K5¼F	CP/M	Ba	●	P5	'6502 I/O processor	
Torch	£3,214	Z80*	4.2	96K	80x30	TvM	●	640x256	W	15	●	1	1	4	●	4x2400K5¼F	CPN	Ba	●	T6	CP/M compatible	
Toshiba T-100	£1,900	Z80A	4	64K	96K	80x25	TvM	●	640x200	W	8	●	1	1	2	●	2x256K5¼F	CP/M	Ba	●	O4	P-ro test March 18
Transam Truscan	£1,983	Z80A	4	64K	80x24	TvM	●	640x288	W	●	2	1	1	5	●	2x190K5¼F	CP/M	●	●	T7	S-100 machine	
Tulip 1	£1,150	8086	8	128K	896K	80x24	M	●	760x288	W	16	●	1	1	6	1	1x5,25K5¼F	CP/M	Ba	●	N2	IBM PC software compatible
Victor 9000	£2,754	8088	5	128K	896K	80x25	M	●	800x400	W	7	●	1	1	4	●	2x600K5¼F	CP/M 86, MS-DOS	Ba	●	D8	Same as Sirius 1
Wang Professional	£3,076	8086	8	128K	256K	80x25	M	●	800x300	W	16	●	2	1	●	●	3x360K5¼F	MSDOS,CP/M80,USCDDP	Ba	●	W4	8087 co-processor optional
Wren	£1,000	Z80B	6	64K	256K	80x24	M	●	512x256	W	5	1	1	3	●	2x200K5¼F	CP/M plus	BBC Basic	●	P8	CPN issue 52 software throw in	
Xerox 820 Model II	£2,415	Z80A	4	64K	80x24	M	●	1024x512	W	●	2	2	2	●	●	2x160K5¼F	CP/M	●	●	R4	Powerful graphics	
Zenith ZF-120-22	£2,978	8088	5	128K	192K	80x25	M	●	640x225	W	18	●	2	1	1	5	●	2x320K5¼F	CP/M, MS-DOS, Z Basic	●	Z1	PCN issue 28

DISTRIBUTORS

A1 ACT Pulsar, 021-454 8585 **A2** Advanced Quality Software, Norwich 21117 **A3** Audiogenic, Reading 595647 **A4** Atlantic Software, Nottingham 462771 **A5** A & F Software, 061-223 6206 **A6** Abex Electronics, 01-203 1465 **A7** Automata UK, Portsmouth 735242 **A8** Apex Trading, Brighton 36894 **A9** Acornsoft, Cambridge 316039 **A10** Amazing Games, 044-46-45740, **A11** Allrian Data Services, 0753 45201

B1 Borsari, 01-580 0502 **B2** Bristol Software Factory, 0272-735022 **B3** Bug-Byte, 051-227 2299 **B4** Bytesoft, 0480-215005 **B5** Beilflowr software, 01-903 1816

C1 Computech Systems, 01-794 0202 **C2** Compact Accounting, Dorking 887373 **C3** Claremont Controls, Rothbury 21081 **C4** Computer Services Midlands, 021-382 4171 **C5** Comshare, 01-222 5665 **C6** Caxton Software, 01-379 6502 **C7** Cyderpress, Wallingford 37769 **C8** Channel 8 Software, Preston 53057 **C9** Chalksoft, 0505-51512 **C10** Construction Computing Services, Blyfield 47541 **C11** Crystal, 0783-282084, **C12** CPL, 0222 567750, **C13** Corporate Modelling Consultants, 01-724 1018

D1 Dataview, Colchester 822714 **D2** DEC, Basingstoke 59200 **D3** Dragon Data, Kenfig Hill 744700 **D4** Digital Research, Newbury 35304 **D5** Diger Software, 0329 467526 **D6** Datcom Computer Services, 0207 508532, **D7** Dynatech, 0481 20155

E1 Encodes Systems, 01-686 9687 **E2** Estrope Computer Centre, 01-263 6921

F1 Ferrari, 01-751 5791 **F2** Farplan Computer Systems, Roas-on-Wyte 64321

G1 Great Northern, Leeds 589980 **G2** Graficom Systems, 01-385 9423

H1 Hilderbey, 01-485 1059 **H2** Hartford Software Norwich, 781156 **H3** H & H Software, Runcorn 65566 **H4** Heinemann, 01-637 3311 **H5** Hiscot, Swindon 26516 **H6** Holland Automation, 06286 63695 **H7** Hewson, 0783-282084, **H8** Heydon DataSystems, 01-203 5171

I1 Informex, 01-318 4213 **I2** Intelligence (UK), 01-543 3711 **I3** IBM UK Product Services, Basingstoke 56144 **I4** JK Software, Blackpool 21556 **I5** Impact Software, 0381-441 4257 **I6** Imagine Software, 051-236 6849 **I7** Ian Copesake, 04867-4755

J1 Jarman Systems, Tring 6841

K1 Kuma Computers, 07357 4335, **K2** Kansas City Systems, Chesterfield 850357 **K3** Knights, Aberdeen 630526 **K4** Keen Computers, Nottingham 412777 **K5** Kobra Mikro Marketing, Henley-on-Thames 2512

L1 Legend, 01-668 5776 **L2** Llamasoft, 07356-4478 **L3** Loxton, 0634 243000

M1 MMS, Bedford 40601 **M2** Microsimplex, Maclesfield 615000 **M3** McDowell Knaggs & Associates, Worcester 612261 **M4** Micro Technology, Tunbridge Wells 45433 **M5** Microdima, 01-843 9457 **M6** Molimex, Bexhill-on-Sea 223636 **M7** Micro Power, Leeds 683186 **M8** Melbourne House, 01-977 9160 **M9** Mercury Software, Darwen 776677 **M10** MicroPro, 01-499 5777 **M11** MicroFocus, Swindon 695891 **M12** Microdeal, St Austell 67676 **M13** Mediatech, 01-903 4372 **M14** Microgram, 01-223 7672 **M15** Multiset Systems, 0424-21179

N1 Owl Microcommunications, Bishops Cleeve 65702 **N2** Omnicron, 01-636 6575 **N3** Ocean, 061-832-7049

P1 Peachtree Software International, Maidenhead 32711 **P2** Padmede, Tielert 21892 **P3** Pegasus, Kettering 522822 **P4** Pete & Pam Computers, 01-769 1022 **P5** PE Consulting Group, Egham 34411 **P6** Personal Computers, 01-377 1200 **P7** PTRC, 01-836 2208

P8 Printivity, 02407-4906 **P9** Psion, 0276-685311 **P10** Postern, 04516-666 **P11** Precision Software, 01-330 7166 **P12** Pete & Pam Computers, 0706 212121

Q1 Quicksilver, Southampton 20169

R1 Rapid Terminals, High Wycombe 26271 **R2** Rabbit Software, 01-863 0833 **R3** R & R Software, Gloucester 502819 **R4** Real Time Printers, 0276-881444, **R5** Richard Shepherd Software, 06286 63531

S1 Systematics International Microsystems, Haverhill 61121 **S2** SGS Software Products, 01-486 7498 **S3** Silicon Valley Trade, 01-242 2807 **S4** Southdata, 01-994 6477 **S5** Supersoft, 01-861 1166 **S6** Seend, Brownhills 378151 **S7** Salamander, Brighton 771942 **S8** Solo Software, Worcester 424152 **S9** Silversoft, 01-748 4125 **S10** Sinclair Research, Cambridge 353204 **S11** Stage One Software, Poole 735656 **S12** SDD Software, 01-670 9275 **S13** Starcade, 051-236 6628 **S14** Ian Stewart, 0259-6084 **S15** Stage Partner, 0532-842385 **S16** Swift Software, 0255-61929

T2 Tamsay, Windsor 56747 **T3** Tabs, Andover 5895 **T4** Thom EMI, 01-836 2444 **T5** Texas Instruments, Bedford 63211 **T6** Thames Software, 01-609 9661

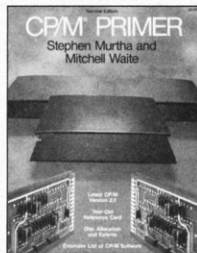
U1 Ulimate, 0530-411485

V1 Virgin, 01-221 7535

W1 John Wiley & Sons, Chichester 784531 **W2** Wdight Software, 01-444 5285

X1 Xitan Systems, 0703-871211

Suffering from keyboard finger? Take a break with a book.



'CP/M Primer' (second edition) by Stephen Murtha & Mitchell Waite, published by Prentice Hall at £14.40 paperback, 150 pages.

Version 2.0 of CP/M, plus a few other changes in the micro world, has merited a second edition of the CP/M primer.

For quite a lot of money, you get nine chapters and a couple of appendices, all with diagrams, screen-prints and cartoons spread liberally throughout.

Why there's a need for an operating system, through to descriptions of CP/M's utilities such as SUBMIT and XSUB are covered. Each section goes over the operation of the different aspects of CP/M, and for the inquisitive this book is a treat.

Sounds good doesn't it? But I'm dubious.

My point is this. If I had just bought a CP/M system for my business, I would want a primer to get me, my machine and my software working in harmony.

Though the primer covers the operation of CP/M and its associated utilities in excellent detail, it fails to explain how to interact with the machine or other software. It baffles me why the authors haven't included relevant sections.

As it is, this primer gives readers interested in the technical information a good (but expensive) read: for those who haven't a clue, it might be wise to shop around. **DI**

'The Complete Commodore 64 ROM Disassembly' by Peter Gerrard and Kevin Bergin, published by Duckworth at £5.95 (paperback, 156 pages).

This is almost the book that many 64 machine code programmers have been waiting for. 'Almost' because it falls sadly short of its full potential. The authors (in the loosest sense of

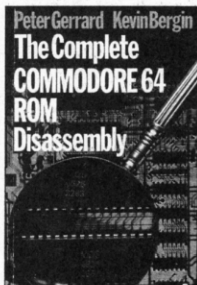
the word) realise this because they start with what should have been an honest apology: 'This book is intended to be used by the serious Commodore 64 programmer' (ie most of you can do nothing with it).

What it might have been is a guide to the operating system and 64 Basic with a disassembly of the ROM routines and how we serious but merely mortal programmers could use them in machine code programs.

It appears that what the authors have done instead is to set up a dump to the printer, started the disassembler running, and gone down the Hare and Hounds for a few pints. This means that everything in ROM is listed here, including the error messages which come out as garbage in assembler language, and you get no hint as to how you might use it.

The listings have been divided into routines but you are left to work out what registers need to be set and what values you need to pass to the routines in order to get them to work for you.

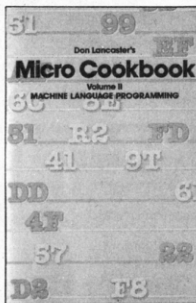
In short, there is nothing here that you couldn't find out for yourself with the aid of a disassembler. You'll be just as confused and will save yourself nearly £6 in the bargain. **PW**



'Don Lancaster's Micro Cookbook Vol 2', published by Howard W Sams, distributed by Prentice-Hall, at £13.55 (Paperback, 450 pages).

Like many others, I've been a fan of Don Lancaster for some time, and I'm glad to say this 'cookbook' (volume 2 in his machine-language programming series) is fully up to scratch.

This one deals with the nitty-gritty form of programming... the hard way. In Hex. Yes,



no-one in their right mind does this, and any sensible person uses an assembler, but Mr Lancaster makes a strong case against the use of such utilities, at least for the first few steps.

He thinks the subtleties of machine-language are obscured by the use of an assembler, and when the tools he employs are examined closely, this starts to make sense.

His main tool is one you make for yourself, a set of index-cards which you draw up from your CPU spec-sheet according to a tightly-defined set of rules, with one card for each op-code, so you must physically transcribe much of the fabricator's documentation.

It sounds like a chore, and it is. But having it done for the MC68000, I assure you that you get a very much stronger feel for the machine, and in the case of micro-coded CPUs, like the 68000, the overall structure of the various op-codes and their relationship becomes much clearer.

This is Mr Lancaster's intention, and he backs up his opinion that though Basic may be fun, and compilers are useful, all really good programming must be done in machine-code. Indeed, his barbed comments about Basic and Pascal make some of the more entertaining sections of the book...

He is careful to cover a sufficiently wide range of CPUs, though it's a pity he didn't discuss the 68000 or 808X chips. **RR**

'Make the Most of your ZX Microdrive' by Ian Sinclair, published by Granada at £4.95 (paperback 99 pages). Trees, it is said, tremble as Ian Sinclair walks by, and this latest

effort from micro computing's answer to Barbara Cartland isn't liable to cheer them up. Its 99 pages may not seem much, but the thinking forest will be justly grieved by the ubiquitous arboricide's profligate use of these pages.

The trouble is, too little seems to have been written too fast. When it finally gets down to the meat of the subject with an explanation of streams and channels, it is certainly useful, but Mr Sinclair doesn't go nearly far enough in answering the questions that arise from Sir Sinclair's inadequate manual.

For instance: 'If you try to load a program called "TEXTINDEX"', however, without winding the cassette back to the beginning, you may find that the program cannot be loaded.' Somewhere in the depths of the Amazon jungle there may possibly be someone who can't work this out himself but I doubt Sir Clive has sent them an order form.

This sort of helpful advice, together with the recommendation not to store your Microdrives in a room where you'll be using sandpaper, is out of place in a book this short.

That said, there is some useful information in the book. The explanation of RS232 is clear, and a short database program is also included.

Mr Sinclair also gives copious details on using Interface 1's RS232 with a Tandy printer-plotter. I'd query his choice of printer, and I'd rather he'd spent less space on this, but the information should at least help you connect up to another printer.

Overall, however, the book really is too sketchy to recommend. It holds some useful information, but not £4.95's worth. **JK**



Sharp MZ80B 48K monitor, cassette unit, dot matrix basic. Forth, many games and utilities. Manuals, user notes and Sharp books £150. Tel Derby 668033.

CBM-64 wants to exchange programs. Send me a list of your programs. Yours will get mine back. Rune Hegdall, Torskrota 14, 6500 KR-Sund-N, Norway.

CBM-64 program exchange partner wanted. Send me your list of Programs and I will send you mine. Rune Hegdall, Torskrota 14, KR-Sund-N, Norway.

Intimidation £35, with cartridges. Will give you £2X81 16K. Tel Staffordshire 513943 SVs even, only.

Dragon 32 DASM assembler plus Zaks' Programming the 68090, 68000, 68010, 68020, Dragon M-code for Absolute Beginners. £2. Tel Bourne ED 06285 20128. Mrs Lazarus.

Dragon 32 "Teletwriter" word processor plus Centronics printer cable £30. Tel Bourne ED 06285 20128. Mrs Lazarus.

Wanted 48K Spectrum software, and add on considered. Tel Havant (Hants) 4570 after 5 pm.

Dragon cartridge games wanted. Will swap several original game tapes each for £10. Jim Fitchie, 23 Russlie Place, Edinburgh. Tel 031-661468.

Sharp PC 1251 cassette computer with printer and cassette recorder. Unused DE 83, cost £180, sell for £100 on V. Bristol, South Meadows, Brington, Avon. Tel 0934 862451.

Atari 1040K perfect condition. 6 months old. Will swap worth over £270. 2 program books. Total value over £170. Only £134. Tel Oxford 57691.

TRS-90 Model 1 Level 216K. As new plus 160K + software, CCR-81 cassette recorder, green screen monitor. All for only £200. Tel Littlewick Green 3476.

Swap my Kong, Ostron, Escape, Orbiter, for your Wimpy, Stokers, Hunchy, Zargon. All originals. Sae to: R. A. Kidd, 20 Buckfast Coast, Stoke Park, Ipswich, Suffolk.

Magis for sale! PCN, Popular Computing Weekly, Sinclair user guides, etc. All lists to: R. A. Kidd, 20 Buckfast Coast, Ipswich, Suffolk.

Pin pal required. I have 48K Spectrum and software to swap. Call exchange hints etc. Write to R. A. Kidd, 20 Buckfast Coast, Ipswich, Suffolk.

Texas TI99-4A speech etc. B. Minn mod, min modules, Parsco, Hunt, Alpine, Chess, House Hold B. Music plus software, word processor, games etc £250 on. Tel Crewe 68831.

Swap ZX-81 16k software. Write to Jerry Hothaus Irstir, 73 4542 ED Hoek, Netherlands. I have a lot of radio-amateur pgn's also!

Oric-1 48K Xenon-1, video modification, cassettes, attach case, printer lead, cassette lead, dust cover, books and articles £115. Tel Gosport 20204 after 5 pm.

Microcot 800 modem, new, still in box. Swap for ZX Spectrum or set £65. Also lots of BBC software, swap or sell. Tel 0474 74584.

Atari 800 48K including mags, manuals, basic cartridge. With joystick. Sell £250. Tel London 272 0701 after 6 pm. Buyer costs.

Spectrum amplifier, as new, runs on Spectrum power, volume control £7.95. Send cheque/P.O. D. Bryant 81, Cambridge Rd, Seven Kings, Hford Essex.

Atari UCS plus all cartridges: Asteroids, Vanguard, Pele's Soccer Combat book, video 2000 edition £80 on. Tel Leeds 823 963538 after 4 pm.

Perfect 20 starter pack, 6K RAM, 3K super expander joystick, 885 of software games (Shamble Matrix...) 2 cartridges, books (reduces price) for £160. Tel 01584 1648 (even).

Back numbers of early computer mags. See for details: Barton, 37 Green Rd, Southsea, Hants 0703 11760.

BBC software to swap. Many latest titles. Please send list to Ashby, 62 Allenby Rd, Southall, Middx UB1 2HO. No calls please.

Atari VCS with Pac-man. Brand new fully boxed. Unwanted prize. Only £49: or swap for T.V. Tel 01-385 3645.

Comma BBC disk drive, 100K, built-in, former supply for IBM, small number games on disk. £160 on. 01-556 5134 after 6 pm (E. London).

Epson MX80F/731 printer (friction and non-heat). Little used. Parallel interface £295 (original pricing). Tel Carlisle 20893.

Computer odds and ends - Micropup F/D controller board (\$100 £20), ASCII encoded keyboard £10, UK 101 computer £16K, Trains £60. Tel High Bridge 01-735 1862.

Dragon 32 edit + cartridge by Compuse, (includes Hi-Re). New disk drive forces sale of this excellent utility. All manuals included. £25 on Tel 0748 5392.

48K edit with cassette, joystick, magazines, 300 titles, 12 games, utilities, all for £200. Tel 0480 58570.

Atari 48K as new including three cassetts games including Moonlander Numerons Powerblaster. Membership of Lynx User. Worth £250, sell for £175 on. Tel 0500 892954.

ZX81 Games £20 Starfighter Pyramid and Artist, 3D Defender, 3D Monster Man, House of Death, Fantasy Games, Asteroids, Spectrum Education 4, Music. Tel 0532 703471.

Games and books for the ZX81, 18 available worth £16. Sell for £4 to anyone. All sold separately. Tel Havant (Hants) 482700 for details.

48K Atari 800 in good condition, intelligent joystick, two books, twelve mags, much software, only £270. Worth over £400. All good condition. Tel Wheatley 0865 98573103.

48K Spectrum, much software, twelve magazines, two books, intelligent joystick interface 2, £270 or swap for £200. Tel Purfleet 7498.

HP-67 Hewlett Packard programmable calculator, 230 steps Magnetic Card Reader, 26 memory registers, more than 50 ready engineering programs in card plus a lot of software. Tel 0382 24858, £250.

Spectrum 3 software AH Diddams, A+B, B+C, B+D, B+E, S, S+O, S+P, swap. W.H.Y. Wanted Biohysics, TI99-4A cassette leads for two recorders, new £3.50. Tel 02357 3567.

Atari 800 in exchange for Sony C6 video recorder, excellent condition, 1.20S preferred. Tel Newcastle 0632 32059.

Composers 64 + C2N unit, unwanted christmas gift, 4 weeks old, 1 year guarantee. £235 on. Tel Kings Lynn 0553 62626 ext 719.

C2N Datensette required, good condition only. Can swap for Atari. Able to pay £20. Tel Luton 597935, after 5 pm.

Dragon Software: Astrochase £12, Chess cartridge £12, sell swap. Wanted Atari tape recorder music centre, cost £310, for Atari software/ware. Basildon 0268 284771.

Atari VCS, plus Pac-man, Asteroids, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50. Write to: M. Georgiou, 86 Woolridge Way, Loddiges Rd, Hackney, E9 6PR, London.

Atari 48K recorder joystick, books, games under guarantee. £250 on. Tel: Hordaan 591477.

Dragon 32 available following upgrade to 64. Cassette recorder and some software thrown in. Bargain £120. 01-870 3805 Panel.

Atari 48K, boxed as new, leads, manual, introductory and own games cassettes. Perfect for MC programming. Excellent condition, guaranteed until November, £150. Tel 074 788 206.

Atari 400/800/600XL software cartridges boxed with instruction manuals, 68000 Command Space Invaders, Defender, Star Raiders, £11 each, £40 the lot. Tel Mike on London 593313 after 6 pm.

Commodore 64 software: Witness (disk) £20, High Flier (disk) £10, Tank Attack, Motor Mania, Cribbage £4 each, Monopoly £3. Tel 0492 30250 after 6 pm.

Cash up to £160 for your Atari 810 disk drive and up to £65 for your 850 interface. Ring Chris on Garston 672235.

Swap VHS 20 plus cassette recorder. Intro to Backup Part 1, joystick, software worth £100, in excellent condition. For 48K Spectrum plus software. 051-678 2257.

Alba CB 82, citizens band, hand held, 100 channels, 100 watts, 1000mhz, 100watt antenna, power meter, channel display, cost £40 sell £25 on. Tel Lewes 0662.

BBC Spectrum software to swap or sell at low prices. Must get rid of. Tel 0482 825234, ask for C. Sinclair.

Atari 48K software for sale, cartridges and drive up to £65 for your 850 interface. Ring Chris on Garston 672235.

Swap VHS 20 plus cassette recorder. Intro to Backup Part 1, joystick, software worth £100, in excellent condition. For 48K Spectrum plus software. 051-678 2257.

Alba CB 82, citizens band, hand held, 100 channels, 100 watts, 1000mhz, 100watt antenna, power meter, channel display, cost £40 sell £25 on. Tel Lewes 0662.

BBC Spectrum software to swap or sell at low prices. Must get rid of. Tel 0482 825234, ask for C. Sinclair.

Atari 48K software for sale, cartridges and drive up to £65 for your 850 interface. Ring Chris on Garston 672235.

Swap VHS 20 plus cassette recorder. Intro to Backup Part 1, joystick, software worth £100, in excellent condition. For 48K Spectrum plus software. 051-678 2257.

Alba CB 82, citizens band, hand held, 100 channels, 100 watts, 1000mhz, 100watt antenna, power meter, channel display, cost £40 sell £25 on. Tel Lewes 0662.

BBC Spectrum software to swap or sell at low prices. Must get rid of. Tel 0482 825234, ask for C. Sinclair.

Atari 48K software for sale, cartridges and drive up to £65 for your 850 interface. Ring Chris on Garston 672235.

Swap VHS 20 plus cassette recorder. Intro to Backup Part 1, joystick, software worth £100, in excellent condition. For 48K Spectrum plus software. 051-678 2257.

Alba CB 82, citizens band, hand held, 100 channels, 100 watts, 1000mhz, 100watt antenna, power meter, channel display, cost £40 sell £25 on. Tel Lewes 0662.

BBC Spectrum software to swap or sell at low prices. Must get rid of. Tel 0482 825234, ask for C. Sinclair.

Atari 48K software for sale, cartridges and drive up to £65 for your 850 interface. Ring Chris on Garston 672235.

Swap VHS 20 plus cassette recorder. Intro to Backup Part 1, joystick, software worth £100, in excellent condition. For 48K Spectrum plus software. 051-678 2257.

Alba CB 82, citizens band, hand held, 100 channels, 100 watts, 1000mhz, 100watt antenna, power meter, channel display, cost £40 sell £25 on. Tel Lewes 0662.

BBC Spectrum software to swap or sell at low prices. Must get rid of. Tel 0482 825234, ask for C. Sinclair.

Atari 48K software for sale, cartridges and drive up to £65 for your 850 interface. Ring Chris on Garston 672235.

Swap VHS 20 plus cassette recorder. Intro to Backup Part 1, joystick, software worth £100, in excellent condition. For 48K Spectrum plus software. 051-678 2257.

Alba CB 82, citizens band, hand held, 100 channels, 100 watts, 1000mhz, 100watt antenna, power meter, channel display, cost £40 sell £25 on. Tel Lewes 0662.

BBC Spectrum software to swap or sell at low prices. Must get rid of. Tel 0482 825234, ask for C. Sinclair.

Atari 48K software for sale, cartridges and drive up to £65 for your 850 interface. Ring Chris on Garston 672235.

Swap VHS 20 plus cassette recorder. Intro to Backup Part 1, joystick, software worth £100, in excellent condition. For 48K Spectrum plus software. 051-678 2257.

Alba CB 82, citizens band, hand held, 100 channels, 100 watts, 1000mhz, 100watt antenna, power meter, channel display, cost £40 sell £25 on. Tel Lewes 0662.

BBC Spectrum software to swap or sell at low prices. Must get rid of. Tel 0482 825234, ask for C. Sinclair.

Atari 48K software for sale, cartridges and drive up to £65 for your 850 interface. Ring Chris on Garston 672235.

Swap VHS 20 plus cassette recorder. Intro to Backup Part 1, joystick, software worth £100, in excellent condition. For 48K Spectrum plus software. 051-678 2257.

Alba CB 82, citizens band, hand held, 100 channels, 100 watts, 1000mhz, 100watt antenna, power meter, channel display, cost £40 sell £25 on. Tel Lewes 0662.

BBC Spectrum software to swap or sell at low prices. Must get rid of. Tel 0482 825234, ask for C. Sinclair.

Atari 48K software for sale, cartridges and drive up to £65 for your 850 interface. Ring Chris on Garston 672235.

Swap VHS 20 plus cassette recorder. Intro to Backup Part 1, joystick, software worth £100, in excellent condition. For 48K Spectrum plus software. 051-678 2257.

Alba CB 82, citizens band, hand held, 100 channels, 100 watts, 1000mhz, 100watt antenna, power meter, channel display, cost £40 sell £25 on. Tel Lewes 0662.

BBC Spectrum software to swap or sell at low prices. Must get rid of. Tel 0482 825234, ask for C. Sinclair.

Sharp M780B with over £1,000 software, printer, 700K disks, CPM, FDOS, Wordstar, Spellstar, Compuser, utilities, manuals, £1,500.00, pos. deliver. Tel: 061-439 8330.

Atari 1040K disk drive wanted, within 30 miles radius of Peterborough. Also Atari games to swap and sell. Tel: Knarr Cross 262 (even).

Atari ZX Spectrum cassette, swap for Atari Adventure (over 16K), preferably level 10, (channel 9) or Scott Adams, Dalt. Tel: Stanton (0359) 50186 with offers (evens).

Spectrum 1040K games, 4 printed + p&p. Also Microdrive offer form. Best offer secures. (R. Bourne). Tel: 0642 (46644).

Atari ZX Spectrum 64K, with twin disk drives, Epson MX80F/TH11 printer, Wordstar, Supercalc and CPM. A super set up, only £1,750.00. Tel: 0737-581829 or 0491-57415.

Oric-1 48K, plus cassette recorder, both under guarantee, with 'Meteor' programming book, £100 postage paid with a new £100. Tel: Blackpool (0253) 894239 after 5pm.

Atari 800, 48K, Recorder De Re Atari (joysticks), £100 of software inc Star Raiders, offers around £300. All still under guarantee. Tel: 021-360 1376.

Hobbit Tape drive for BBC + zero memory option and 7 tapes with programs, offers around £300. Call for details. After 6pm. Tel: 0389 57881.

Valhalla for sale, 8 or swap for the Quill. Games Designer or any Ocean. Bug-By-Night, Incredible Imagine games, etc. Tel: (0793) 695034.

ZX Spectrum interface, 1 Microdrives x 2 ZX printer utility + games, software + books, offers over £500. Offers over £300. M. Blezian, 2 Graylingwell Cottage, Summersdale Rd, Chichester, W. Sussex PO19 4PN.

Microdrive and interface 1 order form. Any offers, £15+ considered. Also Kempston joystick + Interface. £16. Tel: Norwich 36007. Ask for Ashley, after 6pm.

Victor SW132K plus C2N cassette deck. Redundancy forces sale, worth £200, bargain at £150. Tel: (0272) 672562 (even).

PC 32K business, 400 disk, cassette, 3022 printer, Disk-o-rop, Wordpro, KRAM, assembler, utilities and more. New, take £150. Offer over £100. Tel: 07555 57823 (day). Mr. Richards.

Epson HD20 with RAM expansion unit, micro-cassette, mini printer, mains adaptor, 120 min disk, £220 on. Tel: Richard, 01-283 2411 ext 2254, (days) 01-689 9527 (even).

Acorn Atom, £12K, power pack, various games and books, excellent condition. £100.00. Tel: Bristol (0272) 681880 after 6pm or weekends.

BBC Model B, cassette recorder, books by Birtmoun and James. Games £300. All in mint condition. £360. Kevin, Tel: 061-747 7897.

Lynx 48K for sale, £150 with Zen assembler, codes, NLE IG membership, manuals, etc. Financial problems force sale. First one, first go. Tel: 01-205 9359.

BBC B 90S-5, Beebcal ROM, data recorder, joystick, 14' colour, TV/monitor, volume console, tons software, books/mags, etc. cash offers or cash value only. May separate. Tel: 061-757 7076.

Torch 280 disk pack for BBC micro, complete with 4080 track switch conversion, £750. Tel: 0204 69425 (Bolton).

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Atari 48K in excellent condition, 4 months old plus 2 joysticks, Basic Tutor, Persac cartridge and 2 books, £80.00 or swap for Spectrum. Tel: Barnes 01-741 7824.

Billboard

Victor 20 C2N cassette deck Quickshot joystick, Arcadia, Frog, Introduction Basic, Escape MCP, all for £75. Tel: 01-539 2909 after 4pm, ask for W. Kayani.

Newbrain ad with beginners guide tape and manual. Also Z80 assembler and computer cassette recorder, £190 with cables, etc. Tel: 0427-752099.

For sale Jupiter Ace - 16K, RAMpack plus software and manual, all boxed, £50/one. Orio-Forth tape and manual, £100. Tel: 0278-56638 after 6pm.

Dragon 32 with joysticks and cassette recorder. Basic assembler, 9 software, cassettes, books and mags, all superb condition. £125 on sale. Tel: Norwich (0613) 897577 for details.

Oric 1 48K with Forth and Flight cassettes, all manuals, leads etc. £110 or part exchange for Pro-Em or similar synth. Tel: (0940) 612436 (Hampshire).

MPAC1 Quad, Memory Maths modules, battery and charger included. Good condition. Cost £270. Accept £180. Write: Donald Ng., 68 Druid Rd., Coventry CV2 4AT.

Victor 20 + tape deck, 4 games + Basic part 1, 3 months old, hardly used. Owner upgrading. Tel: Donat (0553) 818255 (vics/Norfolk).

BBC Model B brand new £375. Microvitec cab motor brand new £230. Both fully guaranteed and including delivery. Acorn Electron, unused, offers. Tel: Canterbury 756060.

BBC Micro accessories for sale. ATPL sidewire ROM extension board £35. Acorn speech upgrade kit £39, unvated Christmas gifts. Tel: Tony 041-66 1239 (Glasgow).

ZX Spectrum, Interface 2, joystick, recorder, manuals, plus loads of software, all boxed, as new, worth over £210, sell for £130 only. Tel: Leicester 833248.

Spectrum 32K 400 series with built-in monitor, Tookit chip, cover and software. Best offer over £200. Flax Bourne 2830 (Hirst) sold and weekends.

Oric 1 48K with many great games and books, bargain at £110, must sell. Tel: 01-843 0841 now.

Wanted Commodore 64 with cassette deck and instructions and games. Will buy wanted for £150. Tel: 01-647 1942 and ask for Gerald after 5pm.

Oric 1, 48K, Xenon-1, video modification, cassettes, attache case, cassette lead, dustcover, books and articles. £115. Tel: Gosport 520204 after 5.00pm.

Atari disk software, originals. Arcade Machine, game generator £15. The Next Step £10. Tel: Paddock Wood 4240.

Newbrain Model A plus compatible recorder beginner's guide/tape. Gobbler game. Two independent Newbrain Guides. Basic and m/c £150. Tel: (eves) Bourne End 23734.

Tabs for Apple II complete with nominal sales, purchase, stock, fast data entry. Cost £1200, will sell at £600. Contacts, Hortus, Santa Maria, Mallorca, Spain.

Atari software Chess, Count, Covers of Mars, six tricky tutorials, plus OS source listing. Worth over £150. Tel: for £60. Tel: John 01-994 3312.

Phillips 67000 (boxed as new) also selling with two cartridges. Although worth £90. Will sell for £70, but other offers considered. Tel: 01-767 4940.

Ti-99/4A including cassette leads, Munchman Cartridge and all manuals, nearly new only £55 only. Tel: 465 8393 after 5pm.

For sale, Arcadians Meteors Monsters Planets Rocket Rand Snapper. All on disc. £30 offer for BBC Model B also Spectrum software for sale on cassette £8. Tel: Tes. Tel: on Domino 736 after 7pm.

Newbrain Model A as new, 1D6 cartridge and 1 spare cartridge brand new, boxed. Tel: (eves) 0226 89747. 5 Yorks.

48K Spectrum, ZX printer, Fuller master unit, Kempston joystick = interface, books on machine code, 18 tapes: Jetpac, Valhalla, Excellent condition, worth £405, sell for £250 still boxed.

Newbrain Model A as new, printer cable 80 track systems disk, manuals etc. £170 on sale. Tel: Bolton, Lancs 0204 63799.

Atari 600K for sale, unvated Christmas gift with Defender cartridge, joystick, books and manuals. Mint condition, only £150/one. Tel: 0903 42013.

Intellivision Console as new plus six cartridges including Soccer, Space Armada, Demon Attack, Pitfall, Cost £200, accept £80. Scott, 16 Hastings Road, London W13.

Genie Multiboard CPU RAM IVC keyboard Genzap £450 on sale. Nascom 2 disk system Pascal Zeap Nasdiss printer video monitor £750 on sale. Tel: Wexleydale 23459.

BBC, Watford D.F.S. V1, 30 plus £271 plus Watford DFS, manual and fitting instructions £60. Tel: Reading (0734) 290300.

BBC B software for sale. Snooker Q-Bet Zalaga and many more. Tel: Rosendale 214278, ask for Paul.

Newbrain AD, PSU, 200K disk drive, disk controller, COP operating system. £400. Tel: 01-859 6672 after 7pm.

Ezidy Sorcerer 16K complete with leads and manuals, as new in box, £200/one ask for Moeor after 7pm. Tel: Cardiff 382759.

Dragon 32 lots of software Donkey King etc. good reliable cassette recorder and mags and a joystick. The £200 one. Tel: 01-593 6967.

ZX11 16K with Flexisley keyboard, over 20 cassette games + manual, leads and power supply, vgs £50 one. Tel: (0474) 56037 after 5pm.

CBM 3032, 3022 printer, 2031 disk drive, toolkit, disk-o-pro, keychip, loads of extras, books, software including games, business, utilities. £700 one. Tel: 01-668 7167 (eves).

BBC Model B fitted with Watford electronics DFS with cassette leads etc. Brand new unvated Christmas present £425. Tel: 01-340 2586 N. London (eves, weekends, Eric).

Atari VCS, paddles and new joysticks, Combat, Space Invaders, Skiing, Pacman. All excellent condition. £75 the lot. Tel: Potters Bar 45953 after 5.30pm.

TI580 model A 345K C/W built-in monitor plus two games tapes A1 condition. £250 one. H. Davis, 44 Kenyon St., Ashton-U-Lyme, Manchester 016 7LDU.

Atari 400/48K basic, cassette recorder, 20 superb games including Pole Position, Donkey Kong, Jumpman Jr. £160. 60 Spectrum programs: Hobbit, Penetrator £25, Ferguson cassette recorder £15. Wanted: Atari disc drive. Tel: 0922-408050.

Dragon 32+ joystick, programming and games books, £50 of software, lighter. Chipover worth valued at £270. Excellent value at £140. Tel: Reigate 47438 (eves).

Spectrum 48K plus DKTronics keyboard and software including Hobbit, Valhalla, Manic Miner, Alchemist. £160. £100 one. more £180 one. Tel: Caerphilly 865606.

Oric software bought/exchanged. Write Chris, 481/1, 1951 Tower Road, Sliema, Malta.

48K Oric 1 tape recorder and £50 worth of software. Guaranteed until Oct 84. £160. 3 Maplewood, Stacey Bushes, Milton Keynes MK12 6HD. Tel: (0908) 321021.

BBC owners wanted to exchange software (discs or tape). The latest programs especially wanted. Tel: Harpenden 69152 for details.

Pet 8K with integral screen and cassette recorder, including manuals and some software including Space Invaders. £150 one. Tel: 01-748 7050.

48K Oric 1 with over £80 of software, books and mags, all in good condition, worth £240, want £140 only. Tel: 01-675 60855 after 7pm. Harvey (will separate).

BBC software, originals: Acornsoft Chess, Castle of Riddles 6E, BBC/Soft Record Keeper 49, Microworld Memo, £4. Or part exchange for BCLP. Tel: Martin 01-272 0890.

Atari 2600, five cartridges, much software. £100 one. Tel: 01-270 £300, sell for £160 one. Tel: 041-639 2789.

Spectrum owner wishes to exchange ideas about interesting, new, original games/utility programs 16K/48K, and share expenses for worthwhile projects. Joe Burle, 3 Londale St., Leicester LE2 1BF.

Spectrum software to swap: 3-D Tunnel, Golf, Cricket, Manic Miner, Diddums, Mad Martha, Super Spy, Digger Dan, Auto Chef, Gobbler Ghost, Phantasia. Tel: Gravesend 045 226.

Oric owner in N.W. London wishes to contact/exchange information with other owners. Tel: Olive on 904-3267 after 6pm.

Atari 48K, keyboard, recorder, joystick, manuals and over 30 games, lightpen, language + game cartridges. Only £310 one. Tel: 01-363 1978 and ask for Jeremy.

Atari 400/800 cartridges: Star Raiders, Submarine Commander, Centipede, 49,000 cassettes: Pharaohs Curse, Pooyan, Baja Buggies, £7.00. All original boxed. Tel: Bolton, Lancs 57945.

Atari 400 (48K), program recorder, Basic and manual plus Pacman, Donkey Kong, Qix. Still under guarantee, £150. Tel: 0484-653722 after 9.30pm (Camy).

Commodore 64 owner would like to contact others. Also interested in games and disk utilities. Tel: Adrian 0522 27783, Lincoln.

Wanted: Intellivision cartridge. Preferably Demon Attack. Will consider any cartridge in exchange for Iron II or III for £10. Tel: Poole 664243.

Wanted: Commodore printer, 737/2 or 737/1 in good order. Details and price. Tel: 061-439 4841.

Atari 400 48K, Six months old with cassette deck, joystick and over £2000 worth of software £300 one. Tel: De-wsbury (0924) 461543.

Dragon 32 swap Graphics animator, Starters, Compovision, Donkey King, and Nightlife for any cartridges, utility and other software. Tel: (0273) 779295 after 8pm and weekends.

Software swap £2-80K 48K. Many games including Pacman, Asteroids, Invaders. Board games including Chess, Cribbage, from 50p, many languages also available. Tel: 01-246 0093.

BBC/B Mint condition boxed, with leads, manual. Fitted with wordprocessor, also software. Acornsoft, Kamas, Computer Concepts, Bug-Byte, Superior etc. £330 one. Tel: Graham 0902541189.

CBM Pet 4016, plus cassette recorder and two Mupet Multiuser interfaces and all leads, £285 or swap £228 BBC or 48K MZ80. Brighton 725590.

Commodore 64 + C2M cassette + introduction to Basic part one, £200 one. Tel: Leeds 539849 (Wilson).

BBC owners wanted to swap latest software titles. Microware Acornsoft, S&F, etc. Tel: B. Hewitt, 81 Coombe Lane, Stoke Bishop on (0274) 683338.

48K ZX Spectrum tape deck, Kempston interface, 6 books, 7 Sin User, 2 Sin projects, 3 Sin Programs and over 200 programs compatible for the Spectrum. To first call £500 one. Tel: 08206 24536.

Comtronics 730-4 parallel matrix printer + manual, boxed, brand new/unused, 132 columns, 100 CPS. Price new £450, yours for £250. Tel: (0279) 21699 (eves).

Atari 400 cassette software. Swap Leggit for another original tape. Wanted: Amateur magazines and games for swapping. £100. Write: Alan Adams (Maz), Mazias, Smugglers Cove, Bugaboo, Gobbie A Ghost, £4.00 each, £18 the lot. Tel: 01-421 1108 ask for Simon.

Atari 400 cassette software. Swap Leggit for another original tape. Wanted: Amateur magazines and games for swapping. £100. Write: Alan Adams (Maz), Mazias, Smugglers Cove, Bugaboo, Gobbie A Ghost, £4.00 each, £18 the lot. Tel: 01-421 1108 ask for Simon.

Atari software: Miner 2049'er ROM £15, Canyon Clamber £15, Atari Assembler for CBM 64, Also ZX81, Memotech 16K, graphics ROM, game, £55. Tel: Gosport 326905 (eves).

Wanted Easy Script word processor for IBM 64 computer, Terry Ross at Gainsborough, Bracknell, Berks. Tel: 0344-485372.

CBM 64 Jupiter Lander cartridge £8, or will swap for CBM64 Physics in same condition, consider other cartridges. Tel: 028-686 304.

Teac 1MB disk drive c/w power supply, Si. Smagat interface, cased, no D20. Suit BBC, Dragon, Delta 9/blank DSDD disks. £220 one. Tel: 04626-5075.

Spectrum 16/48K, have any software to swap. Tel: Hastings 2244.

Spectrum software swap. Manic Miner, Lunar Jetman, Valhalla, Maziacs, Chess, Flight Simulat, Kong, £3 each. C. T. 1512 2th Eden Road, Skelton, Cleveland

BBC for Xmas? Reliable data recorder and £400 original software available half price. Acornsoft Micro-Power etc. All prices. Tel: 01-689 6563 any-time.

Billboard Buy & Sell Form

To place your Billboard ad, fill in the form on the left, with one word per space, up to a maximum of 24 words. Send the completed form, together with a cheque or postal order for £1.50 made payable to VNU Business Publications, to: **Billboard, Personal Computer News, 62 Oxford Street, London W1A 2HG.** Note that we cannot guarantee that your ad appears in any specific issue, and that we cannot accept ads from commercial organisations of any sort.

Your name:

Address:

Telephone:

MICROSHOP

Rates: £12 per single column cm. Minimum size 3cm. Series discount available. Also spot colour available. **Mechanical Data:** Column width, 1 column 57mm, 2 colours 118mm, 3 columns 179mm. **Copy Dates:** 10 days prior to publication. **Contact:** Christian McCarthy on 01-323 3211

BLANK CASSETTES

Relly on the professionals for guaranteed top quality computer/audio cassettes at great value budget prices. Packed in boxes of 10, complete with labels, inlay cards and library case.

Prices include VAT, post & packing

LENGTH	BOX PRICE	QTY.	VALUE
5 mins (c.5)	£4.55		
10 mins (c.10)	£4.40		
12 mins (c.12)	£4.45		
15 mins (c.15)	£4.50		
30 mins (c.30)	£4.70		
60 mins (c.60)	£5.30		
90 mins (c.90)	£7.00		

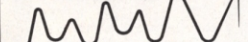
Check/Postal Order enclosed for TRADE ENQUIRES WELCOME. GET BEST TERMS, SERVICE & PRODUCT BUY DIRECT FROM MANUFACTURERS OF PROFESSIONAL BRAND CASSETTES.

NAME _____
ADDRESS _____

PROFESSIONAL MAGNETICS LTD

Cassette House, 329 Hamlet Road, Leeds LS10 3YY

FREEPST Tel: (0532) 760666



* MICRONET * HOME LINK *
* PRESTEL *
* STOP PRESS *

SAVE TIME AND MONEY WITH
AUTO PAGE
FOR 48K SPECTRUM USERS WITH
VTX 5000

Prepare your own index of page numbers OFFLINE to go INSTANTLY to required page. 'Tag' pages while ONLINE to return to them INSTANTLY.

See the time spent ONLINE displayed on screen with alarm displayed from 30 seconds before the end of each 8 minutes call period. GO TO specific Micronet or Homelink sections INSTANTANEOUSLY with INSTANT INDEX SCREEN.

£7.95 inclusive

MERCURY SOFTWARE

74 West Grove, Walton on Thames, Surrey
* STOP PRESS *
Microdrive version now available £9.95

We apologise for the incorrect address given last week.

20% OFF SOFTWARE (RRP)

Games, Utilities educ., adv., for Spectrum, ZX81, BBC, Comm. 64, Oric & Dragon. Send S.A.E. for lists

SPECTRUM	COMM. 64
Atic Attack (Oric)	£4.40
30 Ant Attack (GS)	£5.50
Scada Drive (Overall)	£4.48
Hunchback (Ocean)	£5.56
Lunar Jetman (Oric)	£4.40
Achilles (Imag)	£4.48
Hobbit (Mel. Hex)	£11.56
Super Spy (Shepherd)	£3.20
Pyramid (Jet)	£4.48
Manic Miner (SW Pro)	£5.36
Bongoboo (GS)	£5.36
Chinese Juggler (Ocean)	£5.52
Mr Winky (Ocean)	£5.52
Hobbit (Mel. Hex)	£11.56
Hungry Horace (Mel. Hex)	£4.76
Hover Beaver (Llamasoft)	£5.80
Hunchback (Ocean)	£5.52
Bumpo (Buggles (Bubble Bus))	£5.52

Delivery fast and free. Cheques & P.O.s to

GRP Software (PCN)
81 Openshaw Drive, Blackburn, BB1 8RB

If you don't see it listed, ring for quote on:
(0254) 670915

Computer Pro LIMITED

Dept PCN, 65 The Falconers, Bealton, Essex SS15 5DF

Tel: 0266 412645

Callers welcome by appointment. Access welcome
All orders which accompany a cheque, cash or postal order are carriage free (UK mainland). A carriage charge of 4% of invoice total is applicable on Credit Cards and offshore orders.

Ring for a quote on any printer on the market. S.A.E. for full list giving outstanding value on other computer products.

PRINTERS	
Shiva - C11 CP-80 (Bot. 80cps)	£190.87
Star-Gemini 10X BK. 80cps (P)	£216.88
Star-Tek 100K. 80cps (P)	£231.20
RS232 interface for Star-CP Star-Gemini	£48.88
Roboter for Star-Gemini 41	£11.96
Canon P1110A (Bot. 40cps, 7 colour ink jet)	£252.51
Canon P1110A (Bot. 100cps, 27cps NLQ (P))	£215.15
Canon P1110A (Bot. 100cps, 27cps NLQ (P))	£281.20
Epson RX807 (Bot. 100cps (P))	£242.57
Epson RX807 T (Bot. 100cps (P))	£278.30
Epson RX807 F (Bot. 100cps (P))	£260.60
Epson MX100F T (Bot. 100cps (P))	£412.80
Epson P1100F T (Bot. 100cps (P))	£481.81
JP101 the BBC Spares Jet printer (P)	£149.50
Smith-Corona TP-112 (10cps (P))	£219.88
Daisy Wheel 2000 17" 30cps (P)	£272.00
Just-8102 24, 12" Cartr. 18cps	£66.00
Brother EP44 A4 18cps (S-45P)	£221.14
RS232 interface for Epson & Shiva	£48.88
Ring for printer cables & interfaces	
COMPUTERS	
BBC Model B (C97.90) BBC Model B + disc I/F	£468.00
Chilren-Electronics Unicorn 2000	£501.20
CW IP (S) (Simile disc drive unit) (Apple)	£146.88
Discmate controller card (Apple)	£42.00
PROFESSIONAL MONITORS	
We use only one type of monitor - the best!	
Acorn's official BBC monitor. BT approved.	£83.40
NOVEE 12" 14" 16" 18" 20" 22" 24" 26" 28" 30" 32" 34" 36" 38" 40" 42" 44" 46" 48" 50" 52" 54" 56" 58" 60" 62" 64" 66" 68" 70" 72" 74" 76" 78" 80" 82" 84" 86" 88" 90" 92" 94" 96" 98" 100"	£56.80
NOVEE 12" As above but in non-glass amber	£56.80
NOVEE 12" 14" 16" 18" 20" 22" 24" 26" 28" 30" 32" 34" 36" 38" 40" 42" 44" 46" 48" 50" 52" 54" 56" 58" 60" 62" 64" 66" 68" 70" 72" 74" 76" 78" 80" 82" 84" 86" 88" 90" 92" 94" 96" 98" 100"	£56.80
The above model nos. and prices the same as the Microscopic Co 1431 in addition it provides comp. video and sound as standard in BBC cable.	

TRAINING ON SOFTWARE

On Site Training at reasonable rates

WORDSTAR · SUPERCALC
MAILMERGE · VISICALC
APPLEWRITER · MULTIPLAN

further details from:
Jo Middleton
M.C.T.

485 BIDDEFORD GREEN
LEIGHTON BUZZARD
BEDS. LU7 7TZ
Tel. 0525 376558

INTERFACE PROBLEMS?

NOT ANY LONGER!

WITH OUR CUSTOM BUILT INTERFACES, YOU CAN CONNECT MOST COMPUTERS TO MOST PRINTERS.

Also connection of parallel printers to serial computers, and is UNIVERSALLY COMPATIBLE. If you change your computer, you need not change your interface.

AS REVIEWED IN MARCH PCW
Especially suitable for EPSON HX20, NewBrain, SINCLAIR SPECTRUM INTERFACE 1, Orl, ETC.

Alternatively, state which computer you have, and we will supply the interface complete with BOTH leads.

Uses CMOS, requires no special software, requires no external power connection, small size (150 x 80 x 50 MM), includes printer connector and 1 metre of lead.

ALL THIS FOR ONLY £49.95
ALSO AVAILABLE SWITCHABLE INTERFACES £74.95
SERIAL TO-WAY CENTRONICS £74.95
SERIAL TO-4-WAY SERIAL £59.95
SERIAL TO-SERIAL SERIAL CENTRONICS £74.95
CENTRONICS TO-WAY CENTRONICS £59.95

Additional models plus 125
Most combinations of SERIAL CENTRONICS are available, your combination may be ordered.
Please enquire about our range of software for the NewBrain.
All the above prices include VAT, postage and packing in EUROPE.
Please send orders or enquiries to:

TYPRO LIMITED

30 Camplin Road, Cambridge CB4 2NG

Tel: Day 0255 422087 Eve 0223 322394

THE

RUN
IS HERE

KERIAN wants you

If your program is original. If you can write machine code. If you think you can meet our quality demands. In return we will pay highest royalties. All replies will be answered and appraised within 10 days. Applies to all popular micros.

KERIAN (UK) LTD

29 Gisburn Rd, Hessele, North Humberside HU13 9HZ
Tel: 0482 643786

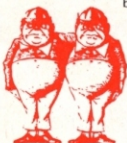
100,000 CASSETTES PER WEEK

This is the capacity of Dataclone's new cassette duplication plant — Europe's most advanced data duplication facility.

* **Fastest possible turnaround** — on small or large runs, we offer the fastest delivery.

* **New low contract rates** — the most competitive prices available, with special rates for regular customers.

* **Top quality & reliability** — we have



DATACLONE

DATACLONE Ltd., the specialists in software duplication.

Unit 1, Roslin Square, Roslin Road, London W3 8DH.

Tel: 01-998 2134. Telex: 21879

the reputation for the highest quality product. Swiss cassette bodies and chrome tape used exclusively.

* **Faulty cassettes eliminated** — our reject rate is below 1% — the industry's best.

* **Custom built plant** — our specially built equipment is designed exclusively for data duplication giving you a consistently better product.

POOLS PREDICTION

Made easy on 48K Spectrum. Outputs best draws, homes and aways. Features analytical finder which allows program to learn from its own mistakes, however small comes with free permutation calculator program.

134 dividends won by writer so far. ("This is the best and most scientific of any program I have seen" Mr Rap Secretary, Orpington Computer Club).

Ask for:

British Pools at **£8.95**

Australian Pools at **£8.95**

Also:

Pontoon (48K) at **£3.95**

ROMBEST,
9 Hawkstone Avenue,
Newport, Salop,
TF10 7SE.

3M Scotch Diskettes TOP QUALITY ... UNBEATABLE PRICES

Ref	Sides	Density	Tracks	TPI	Price per box
744	Single	Double	48	40	£15.90 + VAT
745	Double	Double	48	40	£18.30 + VAT
746	Single	Double	96	80	£21.20 + VAT
747	Double	Double	96	80	£23.60 + VAT

5.25" DISKS — 10 PER BOX

GUARANTEED 24 HOUR DISPATCH NO CHARGE FOR DELIVERY

PLEASE SUPPLY	QTY	REF	DESCRIPTION	PRICE
NAME			TOTAL	
ADDRESS			ADD	
			15% VAT	
			PAYABLE	

CHEQUES PAYABLE TO
COUNTY

COMPUTER SUPPLIES
Unit 22J, Draxville Industrial Estate, Durham, DN1 2XH
Telephone Durham (0385) 42336-40233

bubble bus software

magical games and
utilities for the
Commodore 64 and VIC 20

Available from:

W. H. SMITH, LASKYS, LIGHTNING DEALERS,
SPECTRUM SHOPS, GREENS, HMV SHOPS,
GAMES WORKSHOPS, CENTRESOFT and
PCS STOCKISTS and all Good Dealers.

or direct from:



bubble bus software
87 High Street, Tonbridge
Kent TN9 1RX
Telephone: 0732 355962

WHOLESALE ONLY

For the very best in Oric, Spectrum and Commodore games from all the major software houses.

Also Oric hardware and accessories.

Next day delivery

**RING
VANGUARD LEISURE**
Church Row Chambers
Franklands
London
Preston



PRESTON 0772 617665

BYTE DRIVE 500

AVAILABLE NOW:

ORIC-1, ORICATMOS.....£299

BBCMODEL8 WITH DFS £215

INCLUSIVE OF FREE 3" DISC, V.A.T. AND CARRIAGE.
C.W.O. TO

LiteKara Ltd.
19, FERNBANK CLOSE,
WALDRSLADE,
CHATHAM, KENT. ME5 9NH
TELEPHONE 0634 684342

TAPE COPIER 5

Makes BACK-UP COPIES of ALL SPECTRUM programs (incl headerless, m.c. unstopable) that we are aware of with MANY unique features. **FULL MONEY BACK GUARANTEE** if you are not satisfied.
• LOADS in all program pairs CONTINUOUSLY. Verifies, Stops, Acks. Program Names, HEAD data.
• FULL instructions, very user friendly. MDRIVE copies onto microdrive.
Cost only £4.75 or £5.75 with MDRIVE.
(Overseas + £1 Europe, £2 others)
5 STARS FROM THE HCW REVIEW, WITH 3 out of 4 ratings of 100%

LEM, Dept PCN, COTTINGHAM, MKT HARBOROUGH, LEICS.



ORIC-1 GAMES (48K) from TOUCHSTONE IN VIDEO-STYLE CASES

1. **BLOWTORCH BLASTER** — an ice cool game of skill and action £5.95
2. **THE PITS** — an adventure game with graphics £5.00
3. **ACTION 6** — Tom, Headbug, Bomber, Starshoot, Amaze, Chase £5.00
4. **CONTRACT BRIDGE** — ideal for sharpening your card sense £5.00

Also available

5. **GRAPHICS** — includes ace character generator, 3-D demo £5.00
6. **MIND 6** — Swappers, Haspam, Squares, Slide, Bite, 4 in a row £5.00

TOUCHSTONE
61 Highfield Road, Saxilby, Lincoln

MICROSHOP

GENUINE SALE

TEXAS TI-99/4A	£79.00
SHARP MZ-700	£175.00
VIC20 STARTER PACK	£119.00
DRAGON 32	£125.00
ATARI 600XL	£139.00
ATARI 850 Interface	£100.00
ORICATMOS	£149.00
COMMODORE 1514 DISK DRIVE	£199.00

Prices incl. carriage & VAT
C.W.O. to

Master toys Ltd.,
43, King Street,
STIRLING FK8 1DN
Tel: 0786 64390

Access & Barclay accepted

Disk Drive 1541 for Commodore 64 £215

SOFTWARE	
The Hobbit (Melbourne)	£11.50
Kick Off (Bubble Bus)	£6.00
3D Skramble (Sumlock)	£7.80
Jumpin' 64 (Sumlock)	£7.80
Triad 64 (Sumlock)	£7.80
Gridtrap 64 (Sumlock)	£7.80
RIBBONS	
Epson RX80/RX80FT	£5.00
Commodore 1525/1526	£4.75
Commodore 4022 P	£5.00
Epson FX100	£8.00

Microcomputer Services (Maryport),
2 Borriskill, Ellenborough,
Maryport, Cumbria CA15 7RF.

COMPUTER CABINETS

A range of cabinets and housing units especially designed for your home computer system. Keep it dust free, tidy and secure.

Send S.A.E. for colour brochure.

MARCOL CABINETS

PO BOX 69, SOUTHAMPTON
Tel: 0703 731168

COMPUTER SUMMER SCHOOLS

in Belgium or Sweden
for young people over 11 years

- instruction in English
- Qualified English American Lecturers
- Fully supervised 2-week residential courses (July/Aug)
- Beginners or advanced students
- Education & Recreational
- Learn Computer Applications such as WP and File Handling

ALL IN ENGLISH with an INTERNATIONAL FLAVOUR!

Call or write to:
IDS Ltd., 67 High Street,
Chatham, Kent.
Tel: 0634 400293.



TEL: 08012 3404

8 CLARE DRIVE, THRAPSTONE, NORTHANTS NN14 4TA

WRITE OR PHONE FOR LATEST STOCKS OF FREE CATALOGUE OF NEARLY 600 TITLES FOR ATARI, BBC, CBM64, DRAGON, ORIC, SPECTRUM & ZX81 AT DISCOUNT PRICES. AUTOMATIC FREE CLUB MEMBERSHIP. APPLE, VIC20, IBM, TI994a, TRS80 & CP/M8* ALSO CATERED FOR — ENQ. WELCOME

CALLING ALL 64 OWNERS

IMPORTANT ANNOUNCEMENT

We are pleased to announce the opening of our Flight Simulator department under the personal supervision of Squadron Leader Feraday. All GOOD Flight Simulators in stock from £14.95. A MUST for the 64 is the Spectrum EMULATOR which runs most Software on the 64. Only £12.95 post free.

We really are the 64 specialists with large stocks of 64 hardware software and books for Business and Leisure. Our own Service Department ensures the Best Backup. Ask for our Lists.

PIP PIP CHAPS!!

Milton Keynes Music & Computers,
17 Bridge Street, Leighton Buzzard, Beds.
Tel: (0525) 376522.
Closed Thurs. Own Car Park.

malan SPECTRUM SOFTWARE

ORIGINAL-EDUCATIONAL & GAMES
ALL PRICED AT NO MORE THAN £5

MALAN COMPUTER CLUB — FREE USE OF TAPES

COMING SOON — PROBABLY THE FIRST BLUE
ADVENTURE GAME — "SOHO SEX QUEST"

FOR ALL DETAILS SEND 2 x 16p STAMPS +
NAME AND ADDRESS TO: D. JARMAIN
PO BOX 390, PURLIEGH, ESSEX CM3 6GH

Programs

at last

A spreadsheet that actually helps you to get it right first time.

- mistakes noted while you make an entry
- just backspace to correct
- enter each rule anywhere on the sheet
- your worksheet will always calculate
- you can't remove key areas by mistake
- dynamic prompting

plus

- you use standard algebra
- works to high precision (15 figures)
- file any part, read into any clear area
- full set of features and functions
- defined functions, subroutines, looping
- database, sorting, searching, mail labels

for

- business planning
- scientific analysis
- engineering calculation

The Cracker

£100 + pp + VAT, for CP/M/Z80 and CP/M-86

write now for details

Software Technology Limited
P.O. Box 724, Birmingham, B15 3HQ
tel: 021-454 3330

(dealers this one is easy to demonstrate)

SAFEGUARD 64

A superb machine code program designed to make back up copy of most of your tape-based software

Only £4.50

Write to

ECHOSOFT

10 Trinidad Close
Basingstoke
Hampshire

EASTER COURSES FOR CHILDREN

— Now booking!

Adult courses as usual

Ring: COMPUTER WORKSHOP
ON 01-318 5488

4 Lee High Road, Lewisham
London SE13 5LQ

DRAGON 32 TAPE COPIER

Makes back up copies of all programs (including author machine code) that we are aware of

FULL INSTRUCTIONS, USER FRIENDLY

COST £3-95

MICROSTAR SOFTWARE
90 RUSKIN DRIVE
WORCESTER PARK
SURREY.

SOFTWARE

Programs Wanted

We require quality programs for most micros (except for ZX81). Please enclose use for return of tape.

We pay cash fees, royalties and distribute in the UK, USA and Europe.

Phone: Basingstoke (0256) 25107

or write to:

DREAM SOFTWARE LTD

Dept. PCN, P.O. Box 64, Basingstoke, Hants. RG21

WANTED

PERSONAL COMPUTERS

all models bought for cash
Morgan Camera Company
160 Tottenham Court Road,
London W1. Tel: 01-388 2562

Exhibitions

WALTHAMSOFT '84

THE Home Computer Show for ALL software, hardware peripherals and accessories. Come and exhibit on Saturday, 19th May, 10am-5pm at the Waltham Forest College Main Exhibition Hall, Forest Road, London E17. Only 2 mins from the A102, A406, N102.

Various size stands available, eg. approx 36sq ft £25.

Ample free off street parking and public transport.

Enquiries and Bookings:

LOWE'S EXHIBITIONS & PROMOTIONS
33 Carter Gardens, Waltham,
Hants
Tel: 318 01-354 9039-3498

Proxima

PERSONAL COMPUTER SOFTWARE

Proxima Software presents seven new titles for the BBC Micro as well as three for the Electron. All the programs are unique in that they have been written by Computer User Club members. Traditionally, although seldom seen publicly, Club software has a lot to offer. Proxima Software is striving to give everyone an opportunity to benefit from Club work, Club and Public alike.

	DISC	TAPE
*BEEB-TEXT (Disc only)	£19.95	—
*PIXEL PACKAGE	£12.95	£9.95
*TWO PLAYER GAMES DUET (Electron too)	£10.95	£7.95
*BIG PRINT (Electron too)	£10.95	£7.95
*DISC TOOLS (Disc only)	£12.95	—
*ROBO BRAIN	£10.95	£7.95
*GAMES QUARTET (Electron too)	£10.95	£7.95

For further information on what Proxima Software is all about, please phone or write to us. (An SAE would be appreciated)

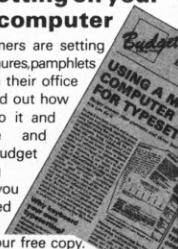
PROXIMA PERSONAL COMPUTER SOFTWARE,
NEWLANDS, 30 SPARELEASE HILL, LOUGHTON,
ESSEX, IG10 1BT. Tel. 01-502-0230 P&P 50p

Typesetting on your Microcomputer

Our customers are setting books, brochures, pamphlets and ads on their office micros. Find out how you can do it and save time and money. Budget Typesetting News tells you all you need to know.

Send for your free copy.

Budget Typesetting Ltd
21 High Street, London SE20 7HJ
Telephone: 01-659 6622



MICROSHOP

CALL

CHRISTIAN
McCARTHY

ON

01-636 6890

Every computer needs CHATTERBOX II

For ZX81 SPECTRUM BBC TRS80 30 APPLE NASCOM VIC/FET 64 (Please state)

NEW! EXCLUSIVE! PITCH CONTROL

CHATTERBOX II can say anything!

Genuine phoneme synthesis - not just recorded speech - hence unlimited vocabulary. Programmable pitch for more natural intonation (exclusive to Wm Stuart Systems) - solid tone cabinet for quality sound - integral beep music amplifier. PLUS expansion socket for BIG EARS voice recognition system. Full instructions technical notes and software supplied with this outstanding educational unit.

DEALER ENQUIRIES WELCOME

As seen on BBC TV "Computer Programme"

BIG EARS

SPEECH INPUT FOR ANY COMPUTER

Hugely successful Speech Recognition System, complete with microphone, software and full instructions.

BUILT TESTED & GUARANTEED PLEASE STATE COMPUTER, UK 101. SPECTRUM ATOM, NASCOM, VIC 20, MOSIN, ZX80 81, PET, TRS80, M280K, APPLE II, BBC MICRO

ONLY £49

ZX81/SPECTRUM

MUSIC SYNTHESIZER (Stereo) + 16 LINE CONTROL PORT

Play 3-part music, sound effects, drums etc. Full control of attack, decay and frequency. Input/Output lines provide control and monitor facility for Home Security, Robot Control, Model Railway etc. etc. Works with or without 16K RAM.

Full instructions software included. Add keyboard to make a live performance polyphonic synthesiser! Note: up to 3 units can be used simultaneously. 9 giving 8 music channels & 48 I/O lines.

AMAZING VALUE AT ONLY £25.50 (BULK)

THE COMPOSER

Synthesise Music Programs. Enter & play 2-part harmony. Includes demonstrations. (Spectrum ZX81) £7

TALKING HANDMAN

For Chatterbox! The classic game carries its colour with a 4-way vocal accompaniment. (Spectrum) £5

ZX81 ARPDUMSEQ

Facilitating synthesiser programming. Generates automatic sequences and saves from keyboard. Some word effects. (Spectrum) £6

CHROMACODE???????

Can you deduce the form by tracking the letter combinations before the line runs out? With Chatterbox voice output. (Spectrum) £6

COLOUR MODULATOR

RGB in. PAL/LiF/Out (not for ZX1)

Please add VAT at 15% to prices. Barclay Access orders accepted by telephone.

£16 BULK £22

All enquiries S.A.E. please

WILLIAM STUART SYSTEMS Ltd

Quay Down House Chatterbox 16, Selsby Way, Wiskey, SP4 0JZ or 080 664 225

FOR THE ZX81 SPECTRUM

An easily operated system for PAYE and BHU calculation. Dispenses with code tables and converts a tedious job into a few minutes operation.

- Automatically computes TAX/NIH For all pay levels
- Produces payroll
- Updates pay/tax in memory
- User-ad justifiable rates and codes
- Up to 30 employees
- MICROSERVE compatible

Program and instruction booklet £14.95 or send £1 and s.a.e. (refundable on purchase) for booklet only.

Willden Services Ltd, Maybank, Yew Tree Lane, Rotherfield, East Sussex. TN6 3JD

GLUG



INCREASE YOUR SYSTEMS SPEED WITH ONE SIMPLE PLUG IN UNIT

INTERNAL SPOOLERS FOR EPSON

8K	£59.95
16K	£69.95
32K	£79.95
64K	£109.95

EXTERNAL SPOOLERS MAINS POWERED

PARALLEL TO PARELLEL: 8K £79.95, 16K £89.95, 32K £99.95, 64K £129.95

PARALLEL TO RS232: 8K £99.95, 16K £109.95, 32K £119.95, 64K £149.95

RS232 TO RS232: 8K £99.95, 16K £109.95, 32K £119.95, 64K £149.95

RS232 TO PARALLEL: 8K £99.95, 16K £109.95, 32K £119.95, 64K £149.95

INTERFACES

IEEE TO CENTRONICS	£69.95
IEEE TO RS232	£79.95
PARALLEL TO RS232	£79.95
RS232 TO PARALLEL	£69.95
COMMODORE 64 TO PARALLEL INC.	
PRINTABLE CURSOR AND COLOUR CONTROLS	£59.95

All prices exclusive of VAT

DEALER ENQUIRIES WELCOME IBEK SYSTEMS

437 Stoney Stanton Road, Coventry, West Midlands
Tel 0203-661162

POOLS PREDICTION

Made easy on 48K Spectrum. Outputs best draws, homes and aways. Features analytical draw finder which allows program to learn from it's own mistakes, however small comes with free permutation calculator program.

134 dividends won by writer so far. ("This is the best and most scientific of any program I have seen" Mr Rap Secretary, Orpington Computer Club).

Ask for:

British Pools at £8.95
Australian Pools at £8.95

Also:

Pontoon (48K) at £3.95

ROMBEST,
9 Hawkstone Avenue,
Newport, Salop,
TF10 7SE.

GLUG



CRL Plumbs the depths

Games make the strain

Should micros carry Government health warning?

This question is prompted not by some story involving faulty power packs but by two recent examples of the way that ordinary people are apt to go bananas for the sake of a game.

In the red corner, meet Derek Creasey, who this morning (Wednesday) is due to sit down in front of a micro and not get up again

for 24 hours in the interests of medical research.

In the blue corner is James Tant, who might be able to give Derek some tips. He's already gone through a similar ordeal in winning £500 as the highest scorer at Splat—between five and seven hours' practise a day for three months.

This is devotion far beyond the call of duty—but if they can survive photo calls like the ones you see, they can probably survive anything.



NEXT WEEK

On Line — A full guide to micro communications starts in this week's *Micropedia* pull-out.

Win a Lynx — Exercise your competitive instincts with a 96K Lynx at stake.

Mac in view — As the dust settles on



Apple's Macintosh, we look more closely at the system as a whole.

Vic-3½ — Program yourself bananas in 3½K on a Vic-20.

Soft Tests — PCN unwraps new packages for the Dragon and the IBM.

Games — Tune in for reviews of new software for the Commodore 64, Oric, and Atari systems.

SPLAT ERRORS

Half a line got the chop in the program Battle Stations (Issue 53). Line 215 should have read: 215 PRINT AT X+1,Y-1; OVER 1;"H"

Apologists to Keyaki, a company we managed to insult in Issue 53. Its Daisy Spot 2000 printer is the original article rather than 'another version' as we said, and at £332 it is apparently selling very well against the nearest competition, which costs £459, not the £299 in our version. The Daisy Spot is available from Dealers around the country or from Keyaki on 0932 242777.

Wotta winna

With the name of English, Mr M of Northfield, Birmingham, was a natural to pick up £5 as the latest winner in the intermittent but nonetheless *Great PCN Gibberish Hunt*.

Mr English was first to point out the clutch of mistakes in Discount Software Supplies' ad in Issue 52 eg Night Ganner, 3B Ant Attack, Alconomist, Sea Harrier Attach and many more.



PCN DATELINES

PCN Datelines keeps you in touch with up-coming events. Make sure you enter them in your diary.

Organisers who would like details of coming events included in

PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

UK EVENTS

Event	Dates	Venue	Organisers
Microcomputer Networks Workshop	March 27, 28	Computer Laboratory, Liverpool University	Ms C Bryson 051 709 6002
Sinclair Education Exhibition	March 28-30	Central Hall, Westminster	Computer Marketplace (Exhibitions) Ltd., 01-930 1612
Electron & BBC Micro User Show	March 29-April 1	New Horticultural Hall, Westminster, London	Susie Lipman 061-456 8383
Computer Aided Design	April 3-5	Met. Exhibition Hall	Reed Exhibitions, 01-643 8040
Artificial Intelligence Seminar	April 7-8	City University, London	Warm Boot Ltd, 01-368 7561
Sir Frederick Osborn School Computer Fair	April 8	Sir Frederick Osborn School, Welwyn Garden City	Alan Henderson, Welwyn Garden 23367/8
COMPEC WALES	April 10-12	Cardiff University	Reed Exhibitions, 01-643 8040
Computers for Builders Exhibition	April 12	Cavendish Conference Centre, 82 New Cavendish Street, London W1	A4 Publications Ltd., 088 385 2051
Personal Computer Games Show	April 20-22	Solihull Conference Centre, Birmingham	Mike Carroll, 01-636 6890
ZX Microfair	April 28	Alexandra Palace, London N22	Mike Johnson, 01-801 9172

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Hanover Fair	April 4-11	Hanover, Germany	Deutsche mess-und Ausstellungen AG Hanover, 01-651 2191
Videotex '84	April 16-18	Hyatt Regency, Chicago	Sally Summers, 0101 212 279 8890

EDITORIAL: Editor Cyndy Miles Deputy editor Geof Wheelwright Managing editor Peter Worlock Sub editors Harriet Arnold, Leah Batham News editor David Guest News writer Ralph Bancroft Hardware editor Ian Scales Features editor John Lettice Software editor Bryan Skinner Programs editor Ken Giarochi Peripherals editor Piers Letcher Listings Editor Wendie Pearson Editor's assistant Nickie Robinson Art director Jim Danstic Art Editor David Robinson Assistant art editor Floyd Sayers Layout artist Nigel Wringrove Publisher Mark Eisen Assistant publishing manager Sue Clements Publishing secretary Jenny Dunne

ADVERTISING: Advertisement manager Sarion Gravelle Assistant advertisement manager Mark Satchell Sales executives Christian McCarthy, Marie-Therese Bolger, John Bryan, Laura Cade, Paul Evans, Deborah Quinn Production Nikki Payne Advertisement assistant Karen Isaac Subscription enquiries Gill Stevens Subscription address 53 Frith Street London W1A 2HG 01-439 4242 Editorial address 62 Oxford Street London W1A 2HG 01-636 6890 Advertising address 62 Oxford Street London W1A 2HG 01-323 3211 Published by VNU Business Publications, Evelyn House, 62 Oxford Street London W1A 2HG © VNU 1983. No material may be reproduced in whole or in part without written consent from the copyright holders. Photost by Quickest, 184-186 Old Street, London EC1. Printed by Chase Web Offset, St Austell, Cornwall. Distributed by Seymour Press, 334 Brixton Road, London SW9, 01-733 4444. Registered at the PO as a newspaper

ZODIAC

COMMODORE



An arcade adventure of awesome proportions. The evil powers of hell have scattered the signs of ZODIAC in the 400 chambers of THE ABYSS. You have to find and recover these magical creations and fight all the way by annihilating all those who stand in your way.

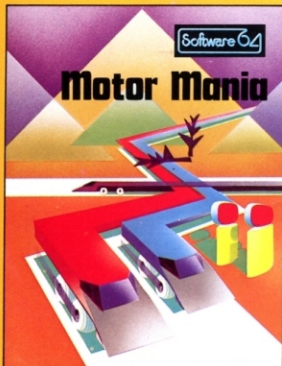
J.S.

£7.95



TRADE ENQUIRIES: ANIROG SOFTWARE LTD., 29 WEST HILL DARTFORD KENT (0322) 92513/8
MAIL ORDER 8 HIGH STREET HORLEY SURREY 24 HOUR CREDIT CARD SALES HORLEY (02934) 6063
PAYMENT BY CHEQUE P.O. ACCESS VISA 50p POSTAGE & PACKAGING

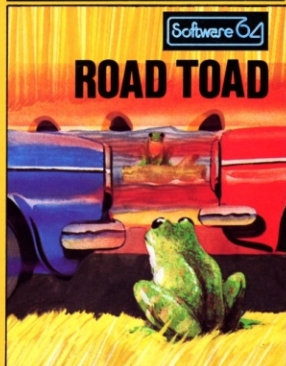
MACHINE CODE GAMES ACTION FOR THE



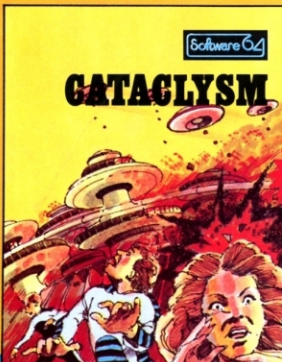
MOTOR MANIA £8.95
THE CLASSIC CAR RACE GAME
FOR THE 64!



RENAISSANCE £8.95
THE MIND-BENDING STRATEGY
BOARD GAME OF OHELLO!



ROAD TOAD £5.95
THE BEST FROGGY GAME FOR THE 64
BAR NONE!



CATACLYSM

Pure shoot-em-up arcade action for the 64 and unexpanded VIC! The Lunar city of Erriam is under attack from the ships of the Jovian empire. Their merciless bombing will reduce your city to a pile of rubble, unless you can hold them off. You are the commander of the sole laser defence base. Your mission - hold out for as long as possible.

BURNIN' RUBBER £5.95

You are an entrant in the great Intergalactic Four Seasons Death Race! You must tackle the Spring, Summer, Autumn and Winter sections with the objective of running as many other cars as possible off the road. The opposition is numerous, including the indestructible but slow Tank Cars, the tricky Deathmobiles and many other Demon Drivers. You have one advantage - your car can fly for a limited distance, allowing you to avoid hazards if you're quick enough! All this and more makes Burnin' Rubber the car race of the century!

WORD FEUD £7.95

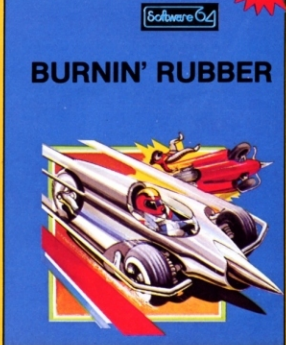
This brilliantly conceived program combines the best parts of arcade games with the best of educational games, making a real family game that anyone who sees the screen can participate in. You have to find the word that is hidden twice in the jumble of letters, then guide your sights over one of the occurrences of it.

The first to find it wins! You can play by yourself or in teams against the computer, or against other players. Three difficulty levels are included to suit young and old alike!



BONZO 64 £7.95

This best-selling game for the VIC-20 is now available on the 64! Featuring the most intelligent and devious monsters you have ever tried to avoid, the Bonzos, this game is a real joystick wrencher. Move Hans, the handyman, up and down the ladders to pick up the boxes from the different levels. But don't meet a Bonzo on the way!



BURNIN' RUBBER

Audiogenic LTD
P.O. BOX 88
READING
BERKS.

PLEASE SEND ME YOUR FULL COLOUR CATALOGUES
NAME
ADDRESS